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OHIO STATE UNIV COLUMBUS SYSTEMS RESEARCH GROUP
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RF-2995-FR 71-2(U)-SEC-2

F/G 15/7

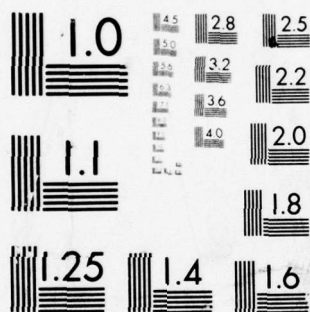
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MICROCOPY RESOLUTION TEST CHART
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REPORT RF 2995 FR 71-2 (U)
SECTION 2

EXTENSIONS TO THE LAND COMBAT MODEL
(DYNCOM) PROGRAM DOCUMENTATION
(Flow Charts of Subroutines DARFO through XYLOCH)

Final Report

Contract No. DAAH01-70-C-0713

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by

Gordon M Clark
Robert J. Wilhelm

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SYSTEMS RESEARCH GROUP
Department of Industrial and Systems Engineering
The Ohio State University
Columbus, Ohio 43210

for

SYSTEMS ANALYSIS OFFICE
U. S. Army Missile Command
Redstone Arsenal, Alabama 35809

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Volume 2, Section 2.

| REPORT DOCUMENTATION PAGE | | READ INSTRUCTIONS BEFORE COMPLETING FORM | |
|---|-----------------------|---|--|
| 1. REPORT NUMBER RF-2995-FR 71-2 (U)-Section-2 | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER | |
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| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) | | | |
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| Armor | Combat Simulation | Subroutines | Firepower |
| Helicopters | Computer Simulation | Communications | Land Combat |
| Missiles | Programming | Detection | Tactical Doctrine |
| Crew-Served Weapons | Flow Charts | Probability | Environment |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This volume contains program documentation for three significant extensions to the DYNCOM combat simulation. Subroutine flow charts and labeled common area descriptions are presented in two appendices for models created to represent: 1) helicopter units in support of armored units up to battalion size; 2) semi-active guided missiles with a ballistic trajectory; and 3) movement of crew-served weapons. The volume is organized in two sections. Section 1 contains the common area descriptions and flow charts of subroutines ADJPOS through CXYLOC. This section contains flow charts of subroutines DARFO through XYLOCH. | | | |

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19. Combat Effectiveness
Protection
flight Dynamics
Intelligence
Target Selection
Firing
Lethality
Terrain
Fire Support
Command and Control

Unclassified

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LIST OF FLOW CHARTS FOR SECTION 2

| | | | |
|--------|-------|--------|-------|
| DARFO | B-252 | LMUSET | B-512 |
| DDSX2 | B-255 | LOADM | B-516 |
| DDSX3 | B-256 | LOIMOV | B-520 |
| DDSX4 | B-257 | LOIPOS | B-523 |
| DEFPOS | B-258 | LOOK | B-525 |
| DEFSET | B-269 | MAIN | B-527 |
| DELETH | B-272 | MFB | B-551 |
| DETH | B-275 | MISEND | B-563 |
| DETT | B-276 | MOUNT | B-568 |
| DRFROK | B-279 | MVCON | B-576 |
| ELVATE | B-281 | MXDSR | B-581 |
| FINAL | B-283 | NATLDR | B-583 |
| FINALE | B-297 | NEWFO | B-586 |
| FIRCON | B-305 | NEWMIS | B-596 |
| FIRMOD | B-332 | NUTARG | B-599 |
| FLGSET | B-337 | OFFSET | B-608 |
| FLIGHT | B-346 | PICKRT | B-614 |
| FRMLDR | B-364 | PRMSET | B-617 |
| FSCHEK | B-368 | REASFO | B-621 |
| FSCMON | B-373 | RETIRE | B-629 |
| FSCVAL | B-388 | REVAL | B-633 |
| FTIME | B-390 | RTATAK | B-640 |
| FUELD | B-398 | RTCROS | B-651 |
| FETDET | B-399 | RTJOIN | B-655 |
| GETHEL | B-402 | RTLOIT | B-661 |
| HDI F | B-307 | RTSECT | B-666 |
| HELFIR | B-412 | RTSELH | B-669 |
| HELCON | B-424 | RTSRCH | B-681 |
| HELMOV | B-433 | SECPRM | B-685 |
| HFI RE | B-438 | SECSET | B-689 |
| HFORM | B-460 | SEEKER | B-695 |
| HFTIME | B-465 | SPDASP | B-705 |
| HHPROB | B-467 | STACLK | B-711 |
| HLNCH | B-470 | STAXIS | B-715 |
| HPROB | B-473 | TFCOMP | B-720 |
| HRAPUP | B-478 | TLETH | B-722 |
| HTCOV | B-480 | TRIG | B-738 |
| HXYMCP | B-482 | TVDET | B-740 |
| INTELL | B-490 | WASAIR | B-746 |
| ISTHFF | B-491 | XYLOCH | B-763 |
| LAUNCH | B-494 | | |

B-251

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| <i>A</i> | |

Subroutine DARFO

PURPOSE: Subroutine DARFO is used to delete the forward observer or MISTIC indirect-fire launcher function when an aerial section is no longer able to perform such a mission.

CALLING SEQUENCE:

CALL DARFO

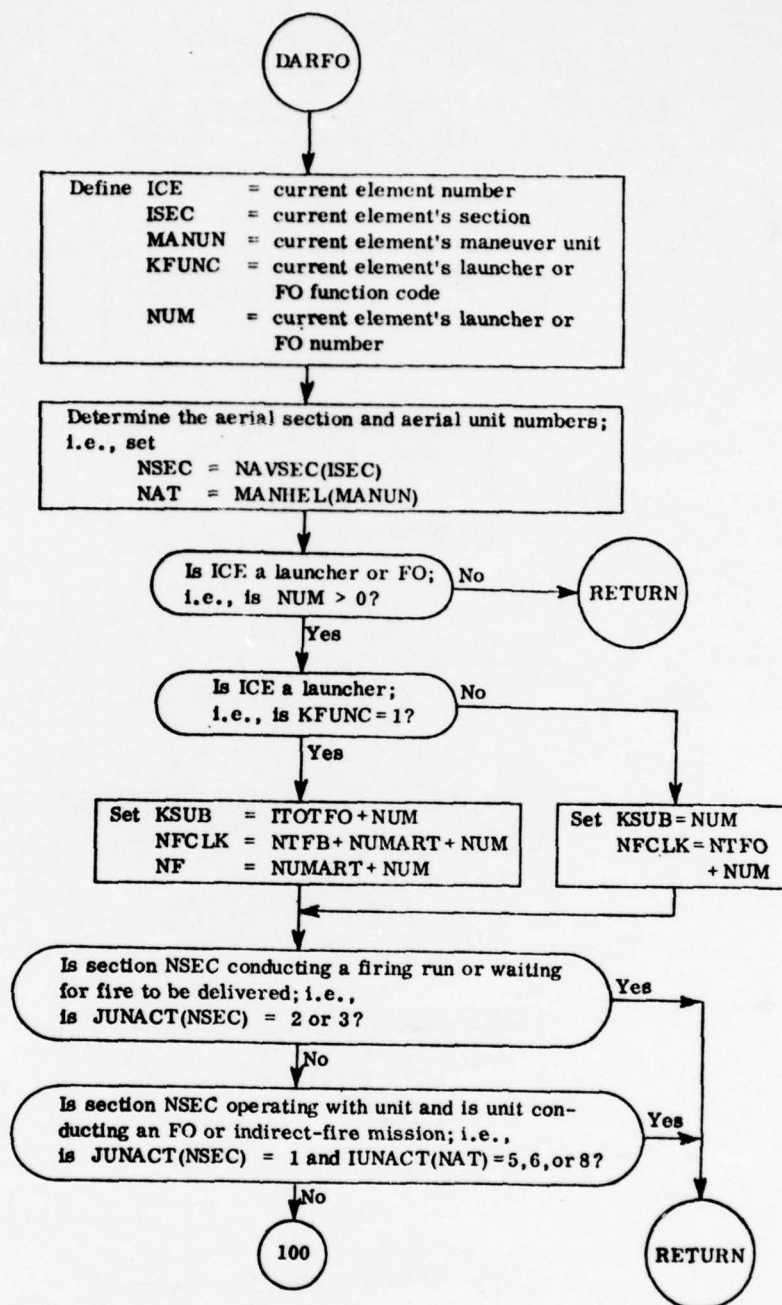
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

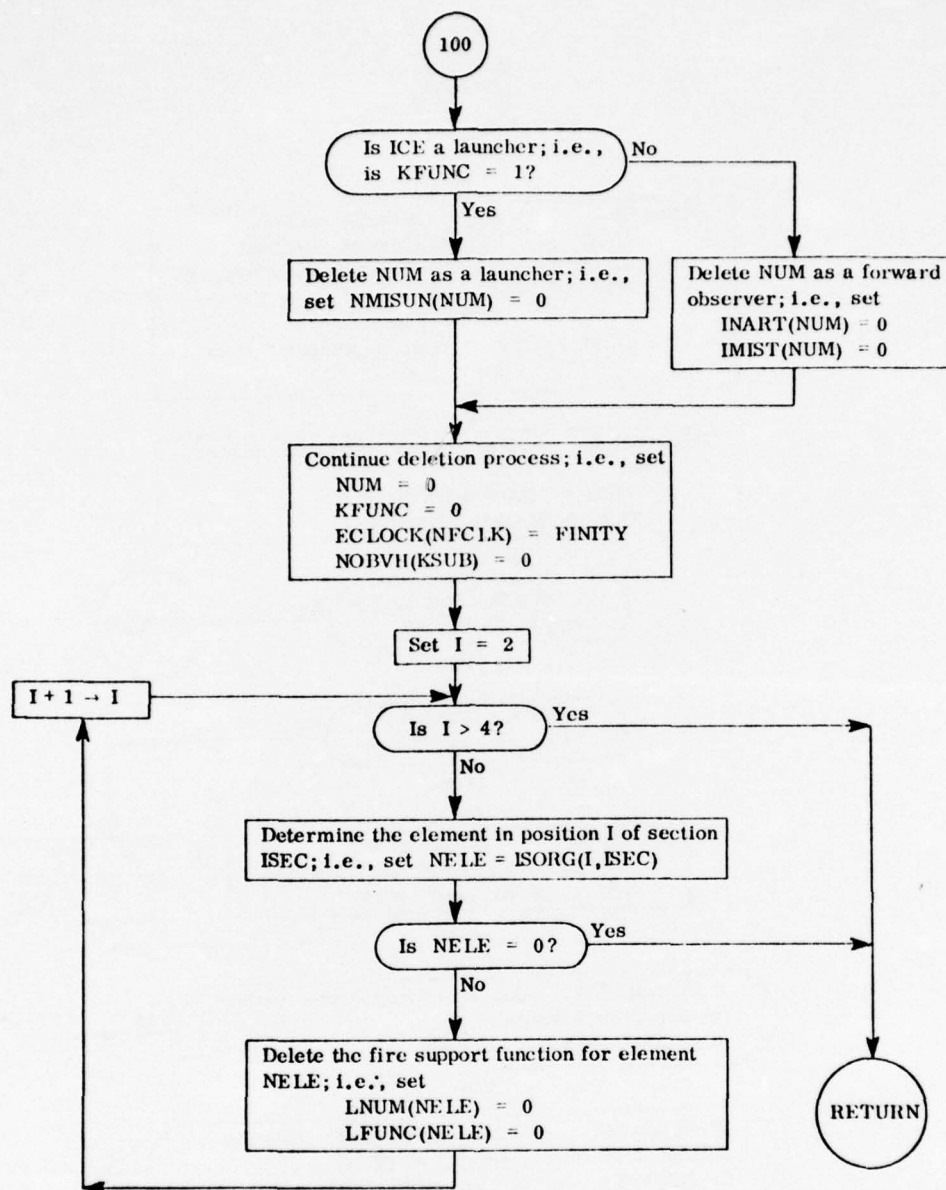
| | | |
|--------|---------|--------|
| ECLOCK | IUNACT | NAVSEC |
| ICECOM | JUNACT | NMISUN |
| IMIST | LFUNC | NOBVH |
| INART | LNUM | NTELE |
| ISORG | MANHILL | NUMBER |

SUBROUTINES REQUIRED:

None



Subroutine DARFO: Aerial Launcher and Forward Observer Activity Controller



Subroutine DARFO: Continued

Subroutine DDSX2

PURPOSE: Subroutine DDSX 2 performs an interpolation of dispersion for moving firer hit probabilities based on 1) range and 2) the firer speed.

CALLING SEQUENCE:

CALL DDSX2(ANS, IT, IW, I)

where

ANS = the returned dispersion

IT = the rough terrain code plus one of the features containing the firer

IW = the mobility code of the firer

I = $\begin{cases} 1 & \text{for horizontal dispersion} \\ 7 & \text{for vertical dispersion} \end{cases}$

COMMON AREAS REFERENCED:

FMHITP

SATARG

SUBROUTINES REQUIRED:

None

Subroutine DDSX3

PURPOSE: Subroutine DDSX3 performs an interpolation of dispersions and fixed biases for main tank rounds dependent upon 1) the speed of the target, 2) the firer target aspect, and 3) range.

CALLING SEQUENCE:

CALL DDSX3(ANS, I)

where

ANS = the returned interpolated value
I = $\begin{cases} 1 - \text{horizontal fixed bias} \\ 2 - \text{vertical fixed bias} \\ 3 - \text{horizontal dispersion} \\ 4 - \text{vertical dispersion} \end{cases}$

COMMON AREAS REFERENCED:

HITPRB

IAMMO

SATARG

SUBROUTINES REQUIRED:

None

Subroutine DDSX4

PURPOSE: Subroutine DDSX4 performs an interpolation of kill probabilities for tank targets dependent upon 1) range, 2) firer target aspect, and 3) target speed.

CALLING SEQUENCE:

CALL DDSX4(IK, ANS)

where

ANS = the returned interpolated value

IK = the kill type for which the probability is desired.

COMMON AREAS REFERENCED:

IAMMO

PKTNK

SATARG

SUBROUTINES REQUIRED:

None

Subroutine DEFPOS .

PURPOSE: Subroutine DEFPOS is used to determine the coordinates of a defensive position, a waiting position or a retirement position for an aerial section or unit.

CALLING SEQUENCE:

CALL DEFPOS(NUNIT,KDEC)

where

NUNIT = unit for which a position is desired
(aerial team if positive, aerial section
if negative)

KDEC = { decision indicator for unit NUNIT
1 a retirement position is to
be determined
2 a defensive position is to be
determined
3 a waiting position is to be
determined

METHOD: See Chapter 4 of Volume 1.

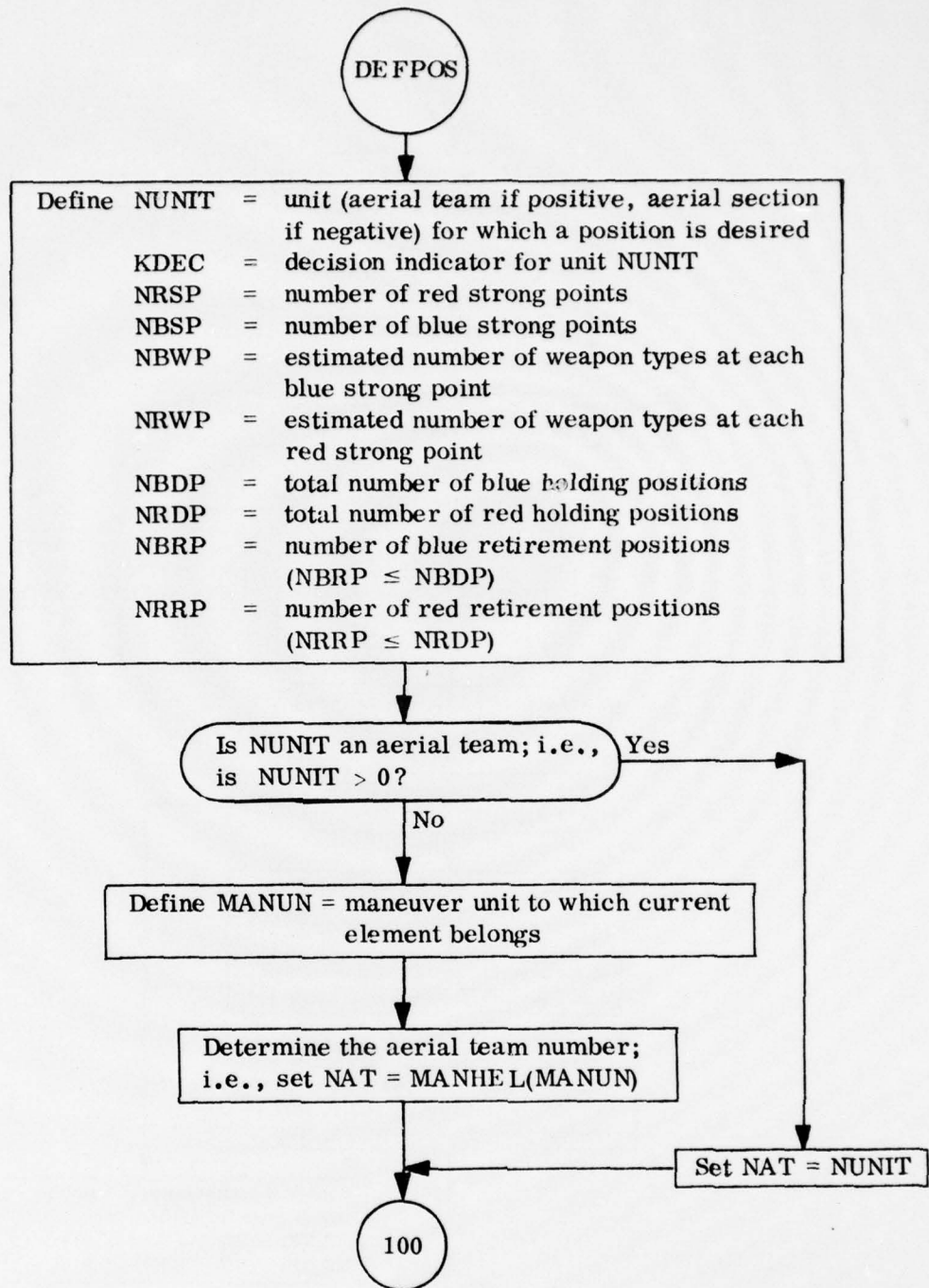
COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| DELAY | LKILL | NUMBER |
| ELOCX | LMANU | S |
| ELOCY | LSEC | SPTS |
| ET | LWCOD | T |
| EW | MANHEL | XD |
| FORMSE | MANLDR | YD |
| ICECOM | NAVSEC | XS |
| KMANU | NDELPT | YS |

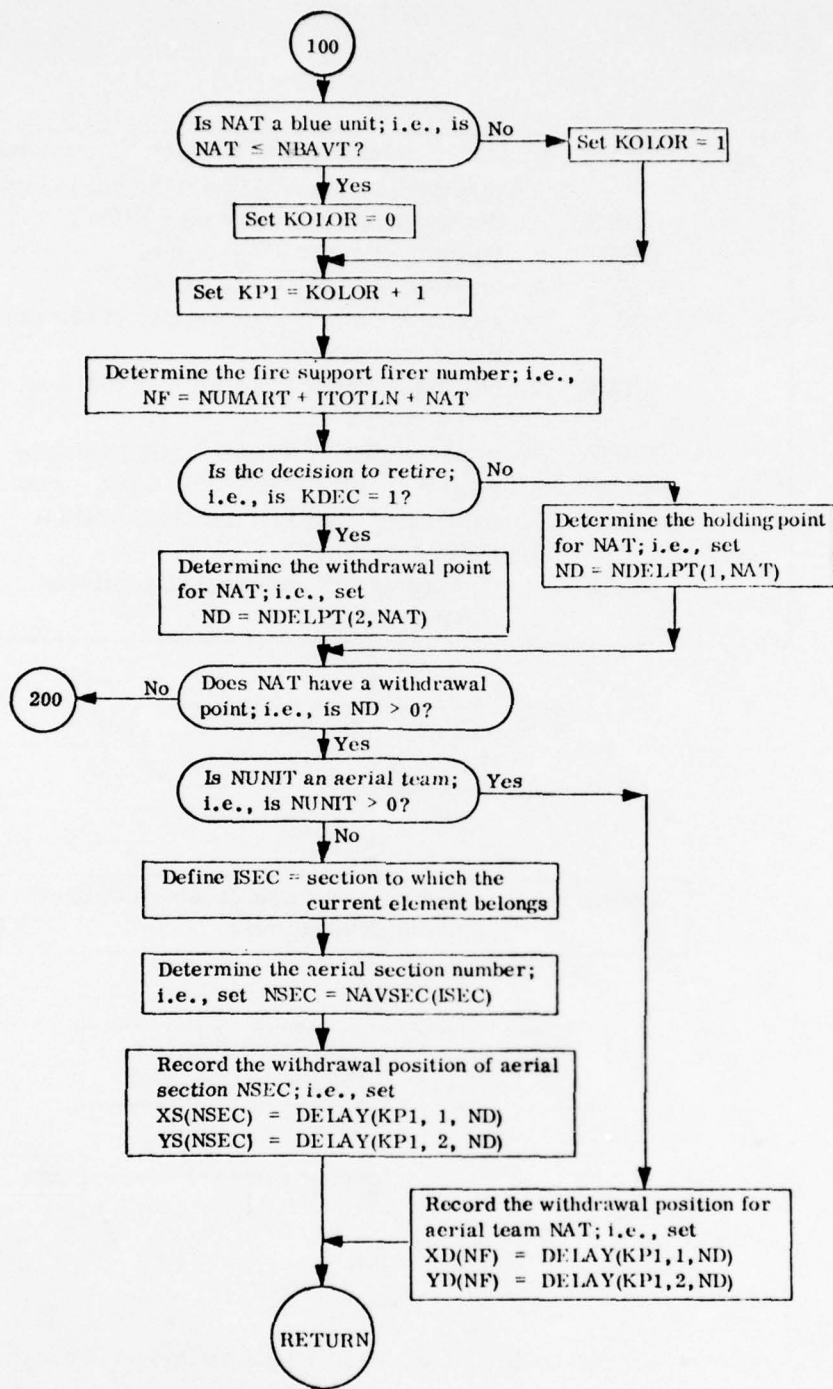
SUBROUTINES REQUIRED: GETDET

DEFPOS CALLED BY: ATKPRM, HELCON, HELFIR, PRMSET

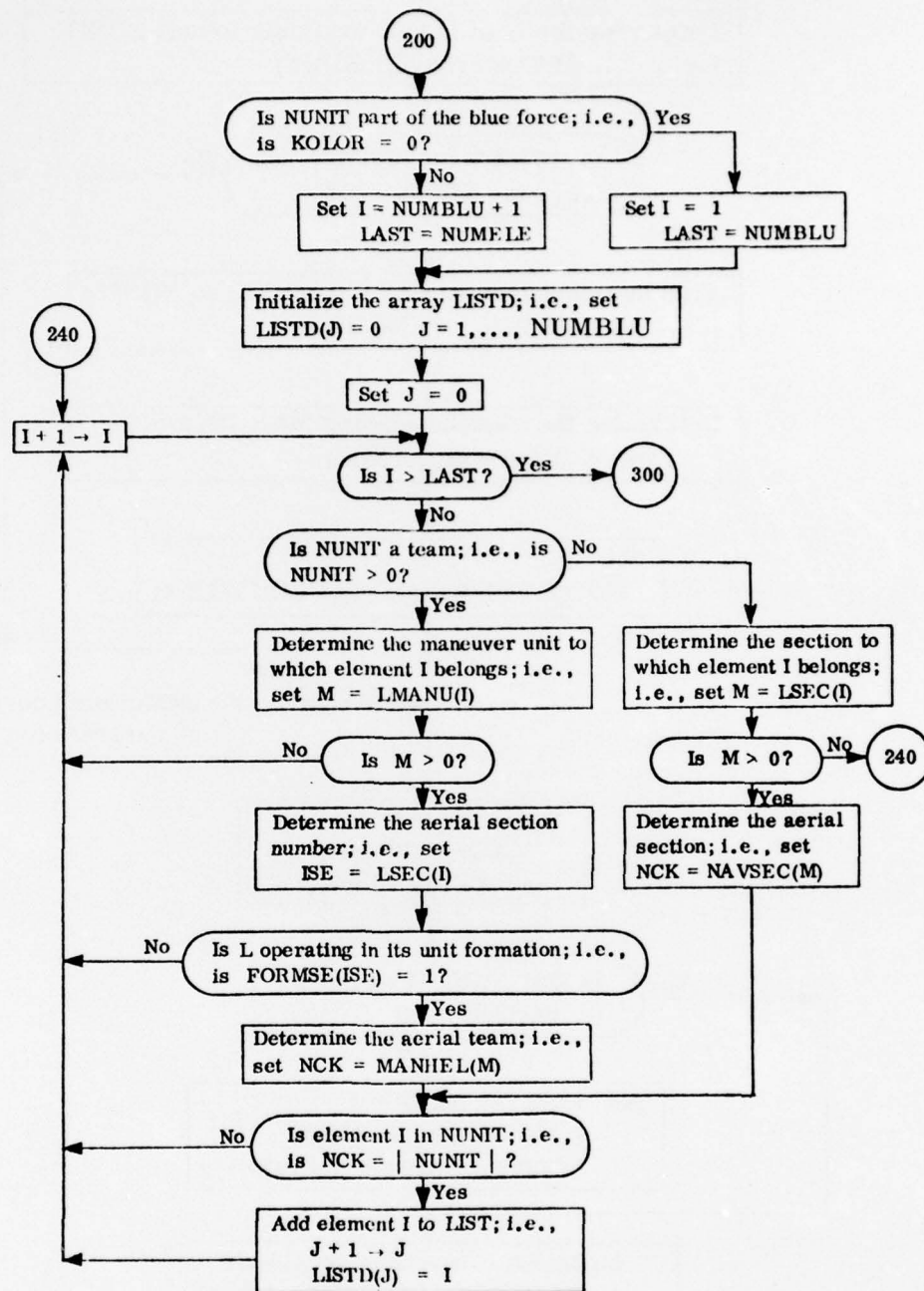
LENGTH: $1186_{16} = 4486_{10}$ bytes



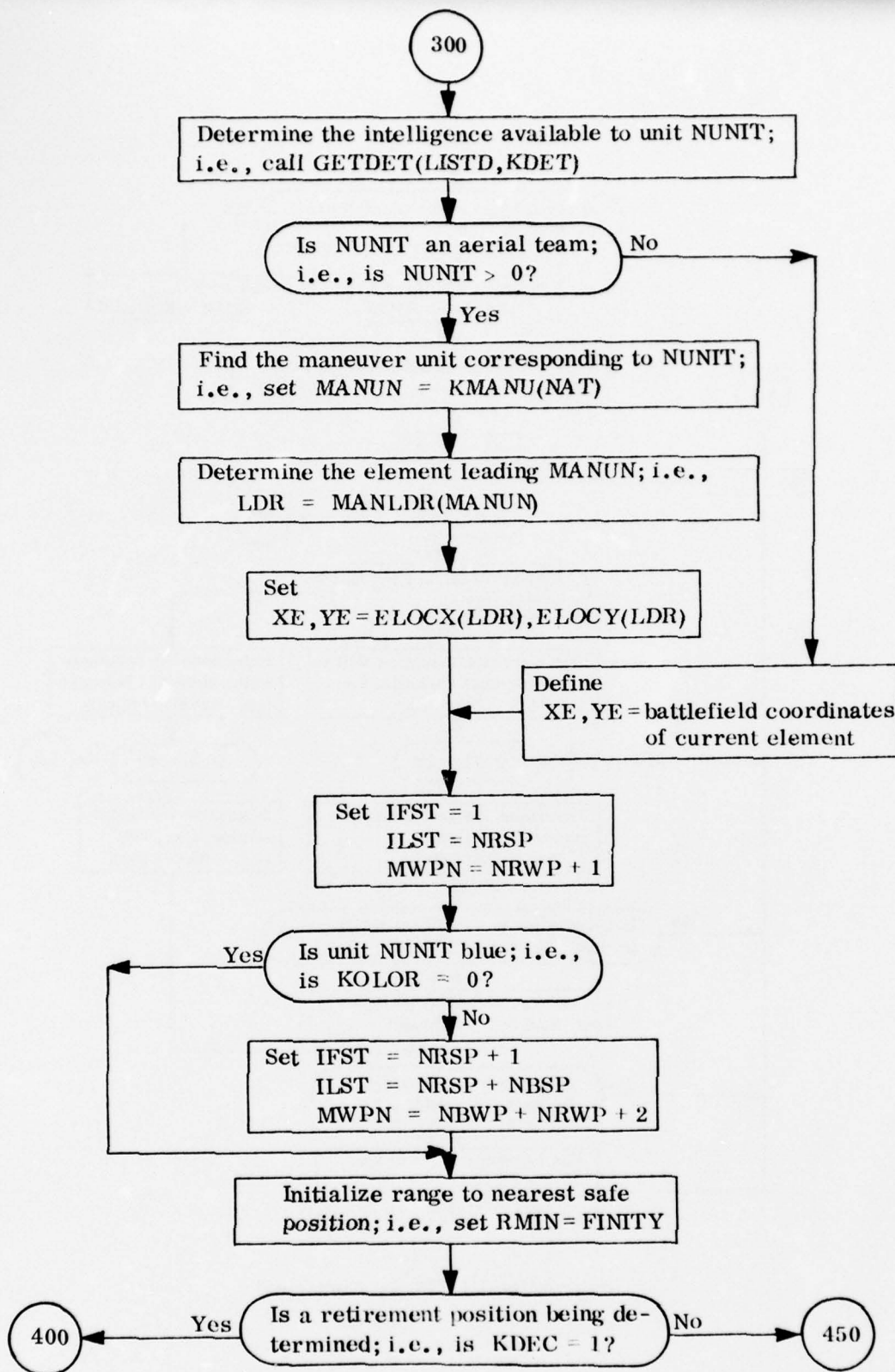
Subroutine DEFPOS: Selecting a Defensive or Retirement Position



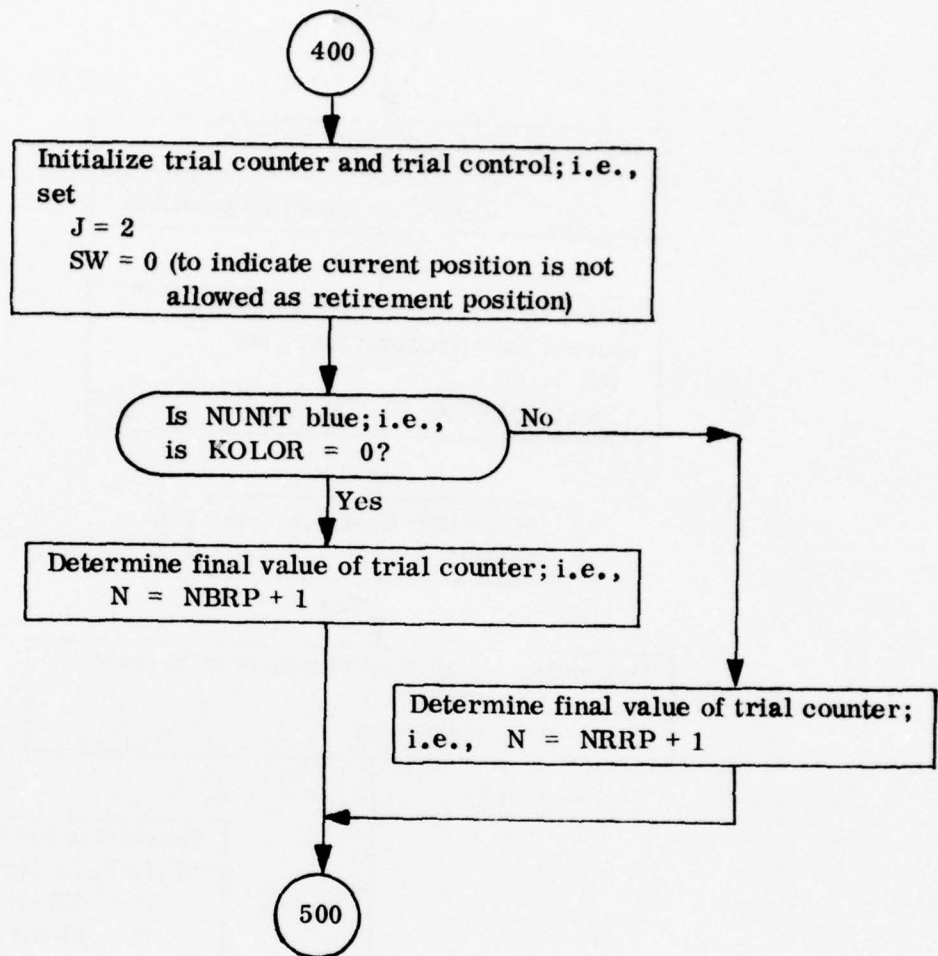
Subroutine DEFPOS: Continued



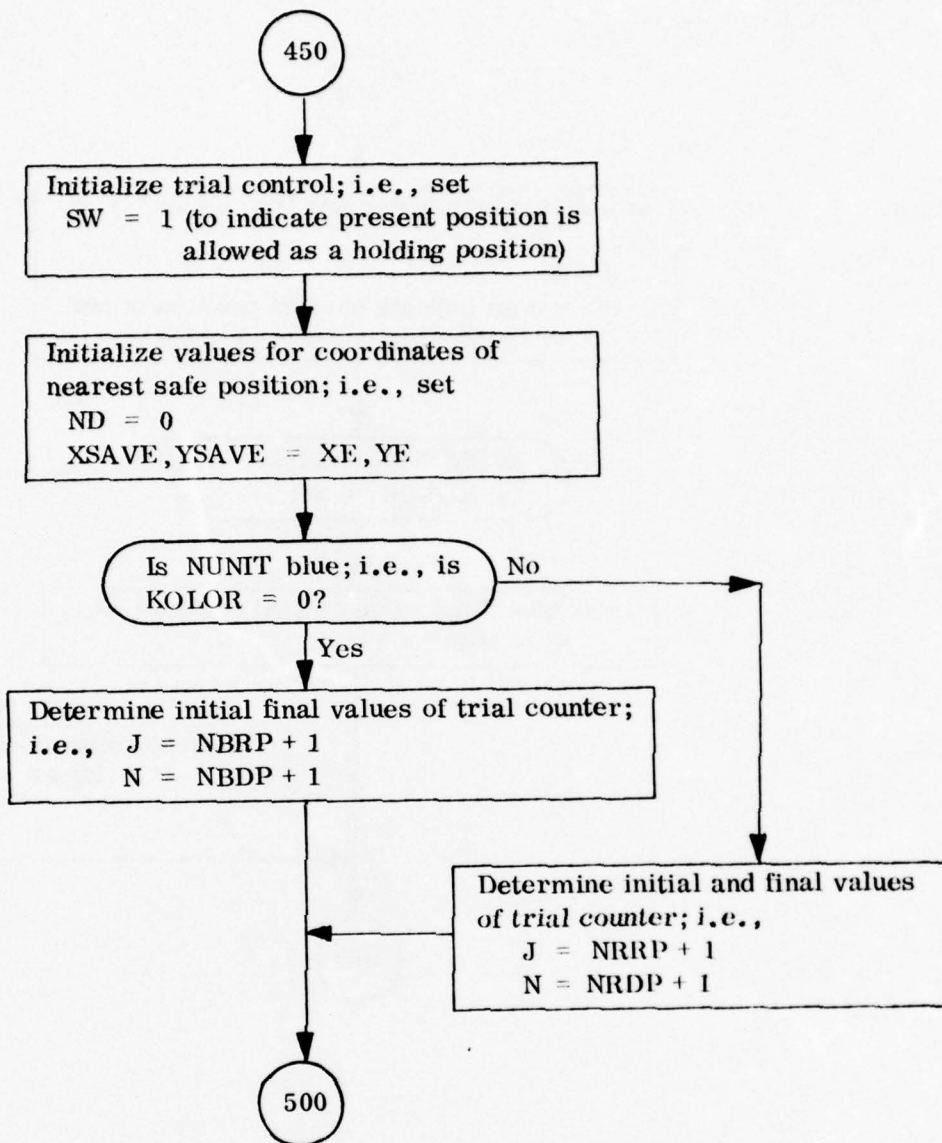
Subroutine DEFPOS: Continued



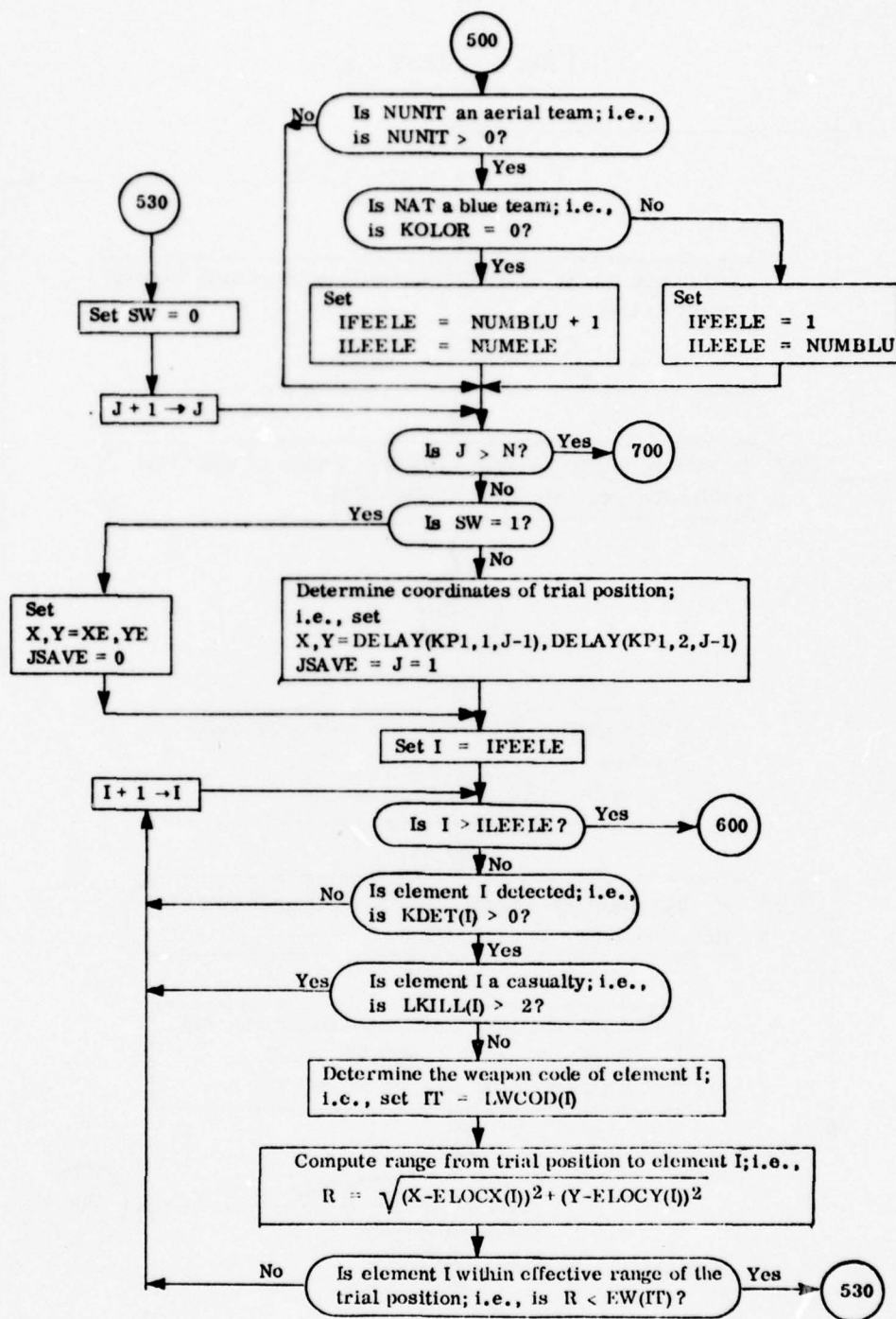
Subroutine DEFPOS: Continued



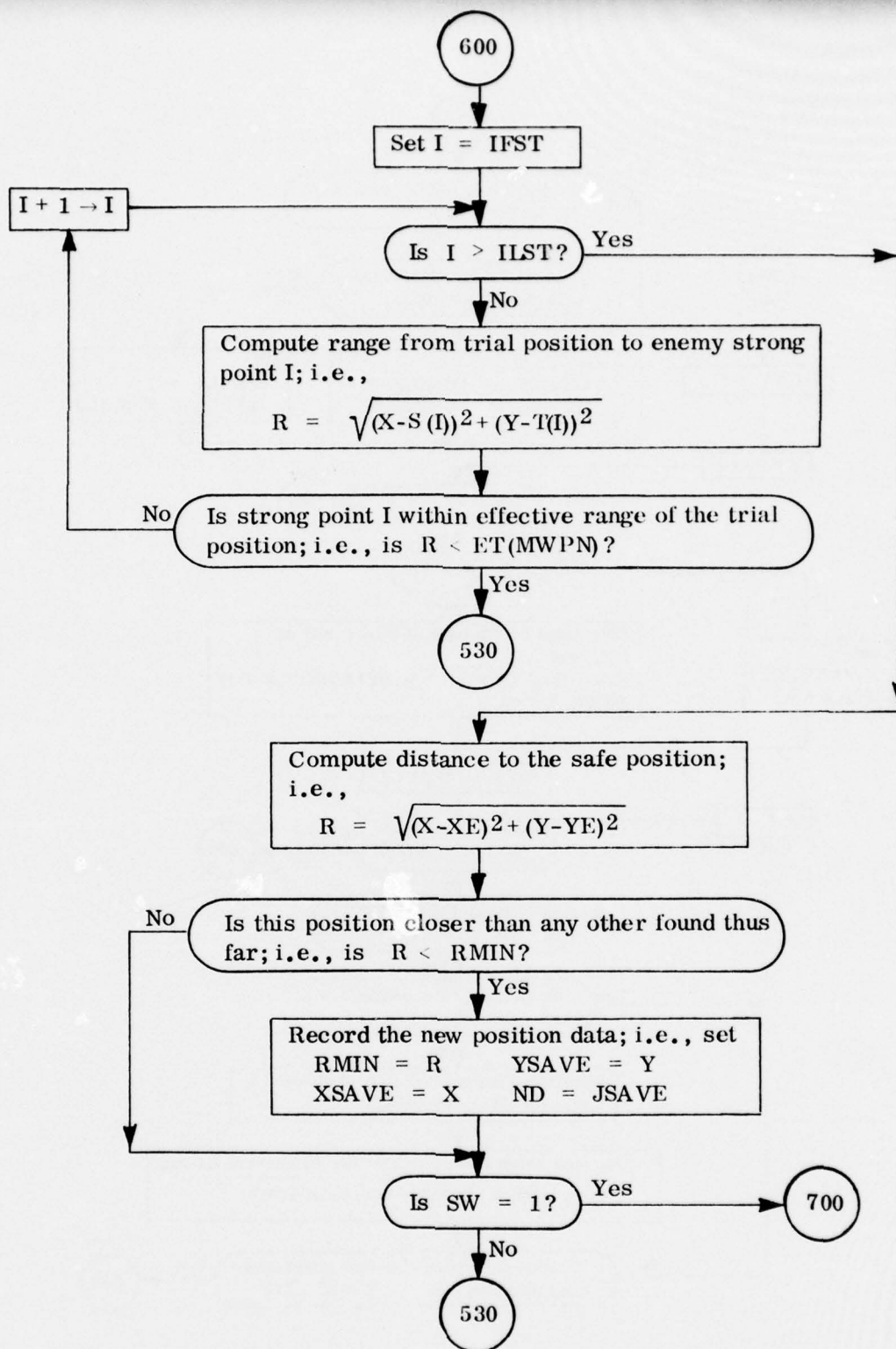
Subroutine DEFPOS: Continued



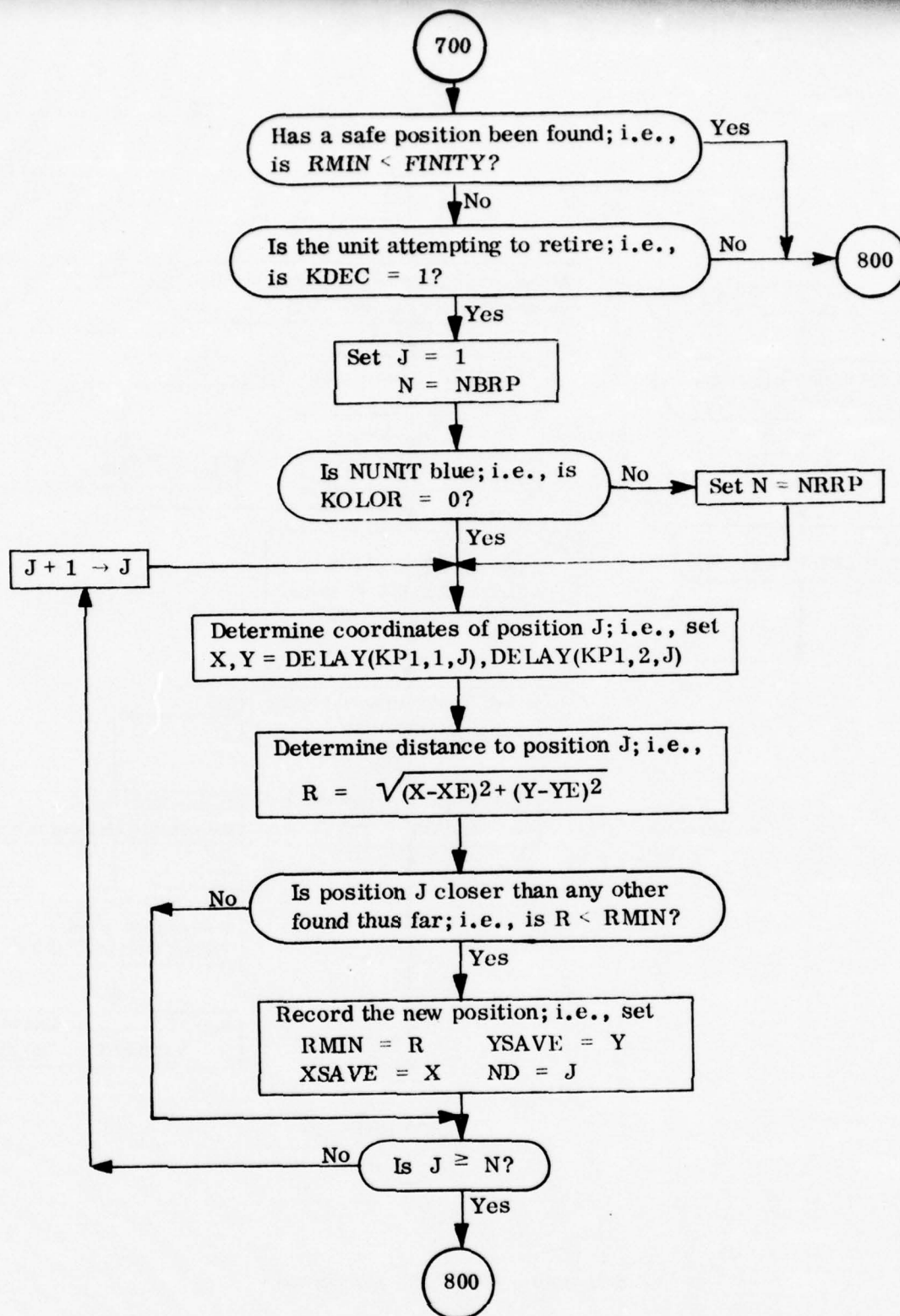
Subroutine DEFPOS: Continued



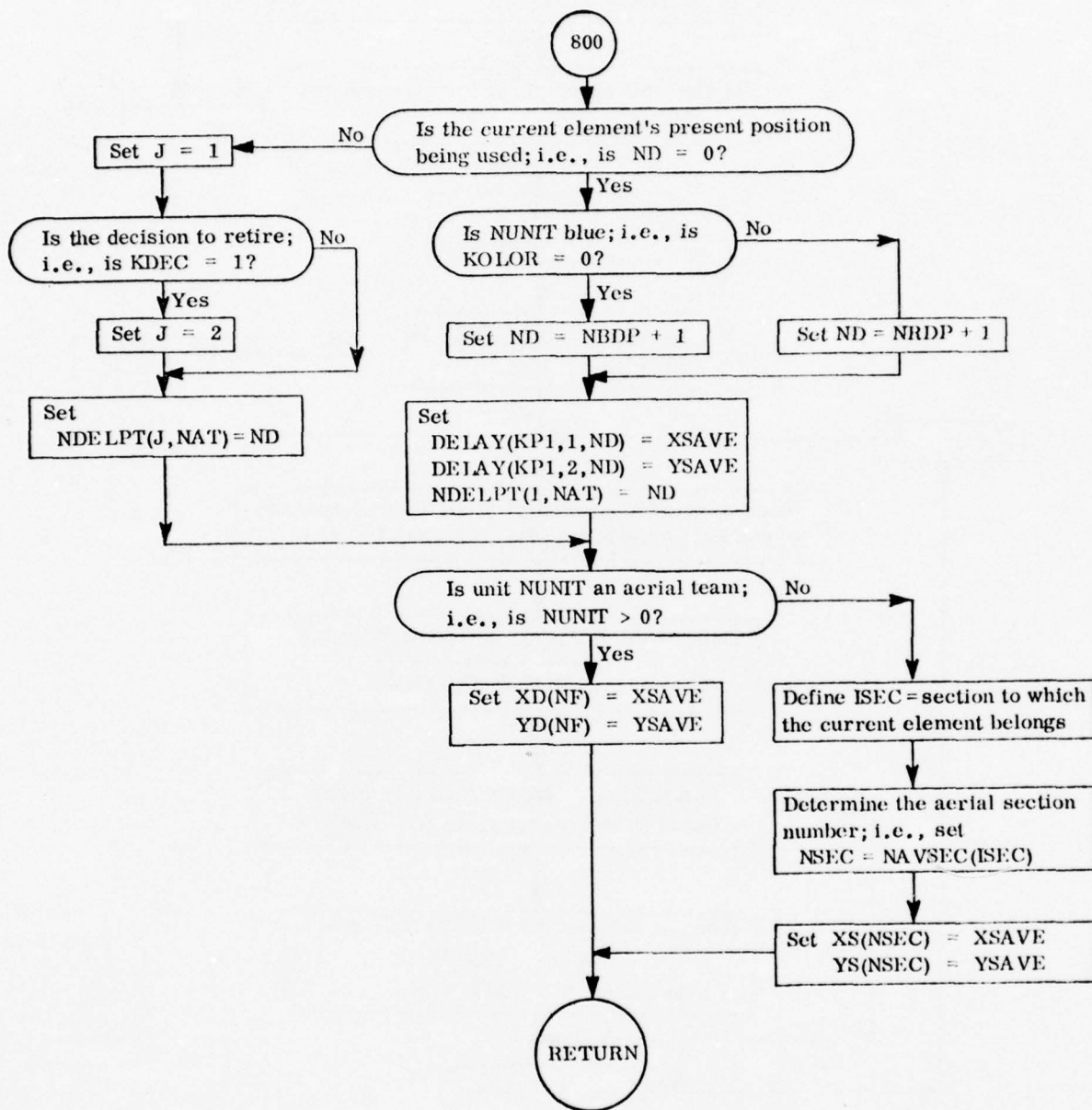
Subroutine DEFPOS: Continued



Subroutine DEFPOS: Continued



Subroutine DEFPOS: Continued



Subroutine DEFPOS: Continued

Subroutine DEFSET

PURPOSE: Subroutine DEFSET is used to delete the recorded defensive position for an aerial maneuver unit whenever all sections of the unit have departed the position.

CALLING SEQUENCE:

CALL DEFSET(NAT)

where

NAT = number of aerial maneuver unit being processed

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| IPORG | JUNACT | MANTYP |
| ITORG | KMANU | NAVSEC |
| IUNACT | MANORG | NDELPT |

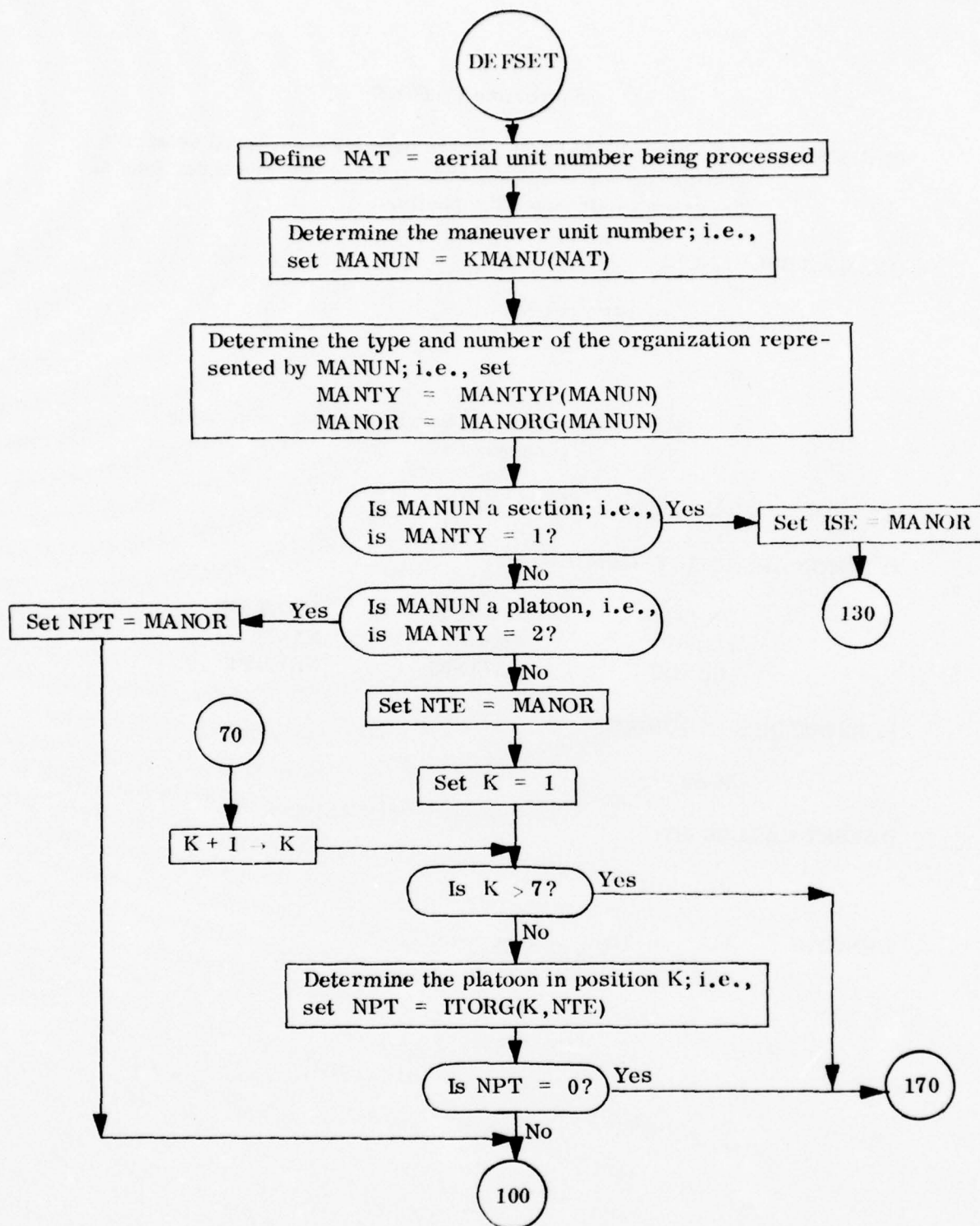
SUBROUTINES REQUIRED:

None

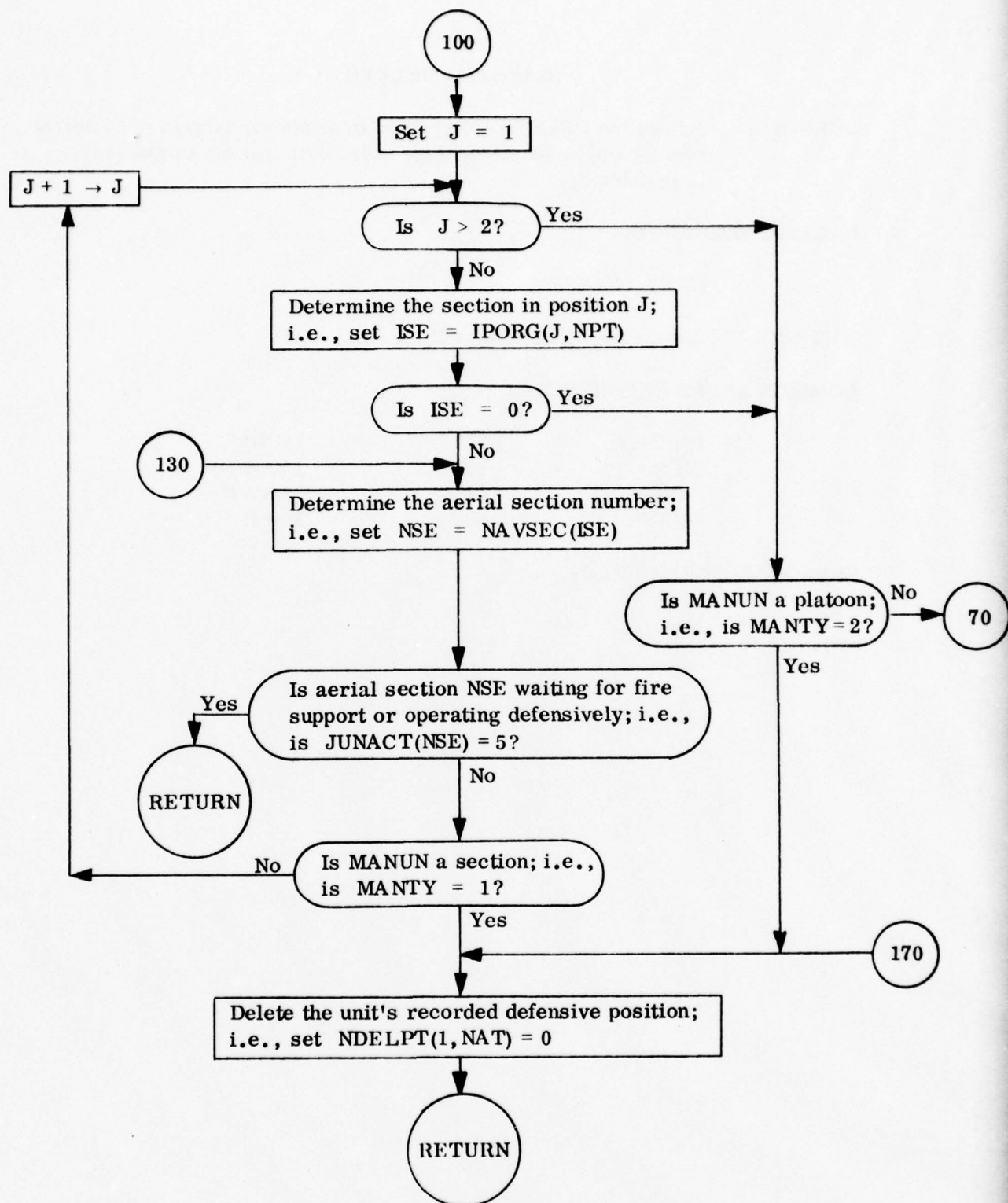
DEFSET CALLED BY:

HELCON

LENGTH: $442_{16} = 1090_{10}$ bytes



Subroutine DEFSET: Deleting the Recorded Retirement or
Defensive Position for an Aerial Unit



Subroutine DEFSET: Continued

Subroutine DELETH

PURPOSE: Subroutine DELETH is designed to delete the targets of an aerial section and to set firing flags to indicate that the targets have been deleted.

CALLING SEQUENCE:

CALL DELETH

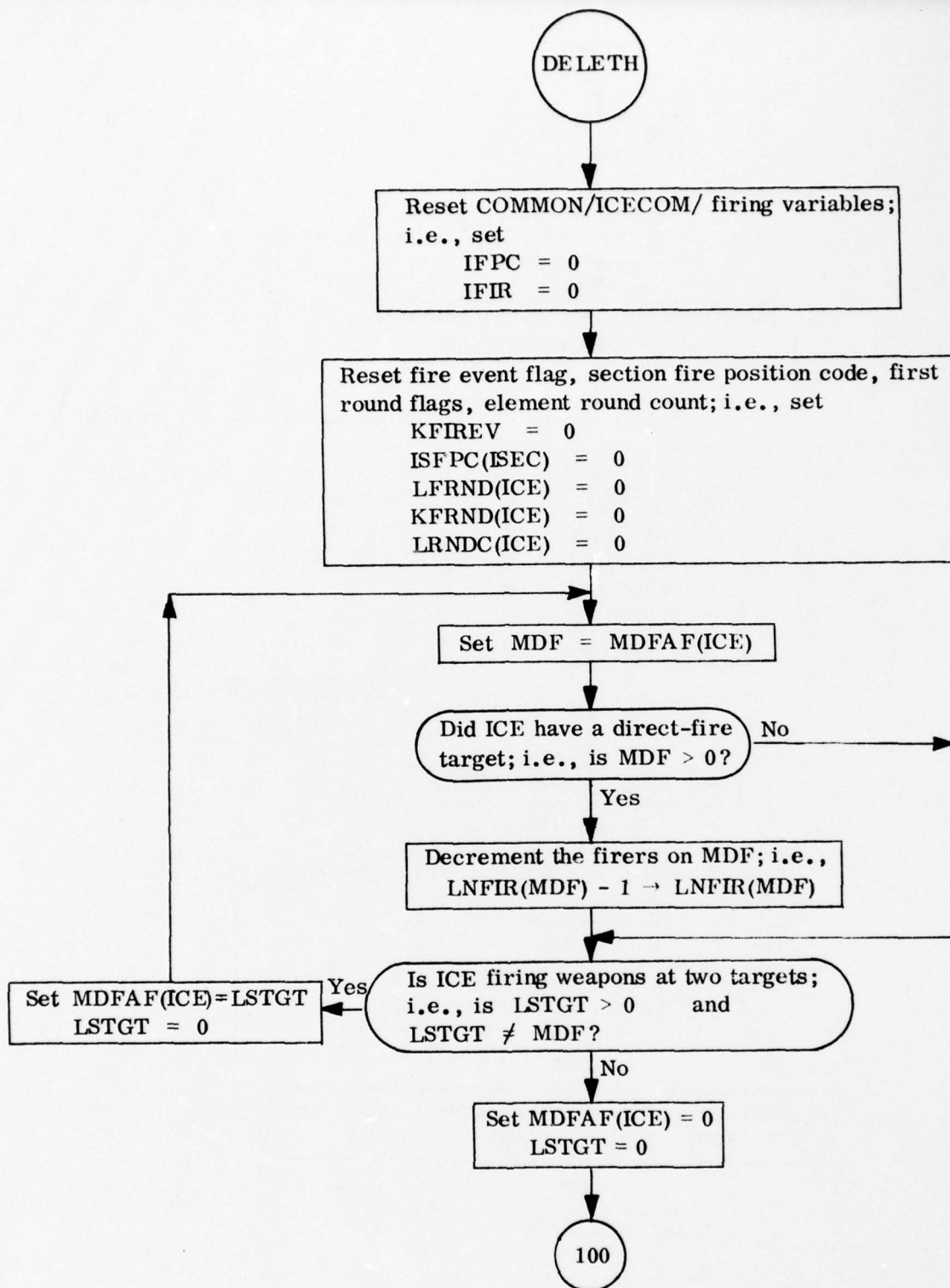
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

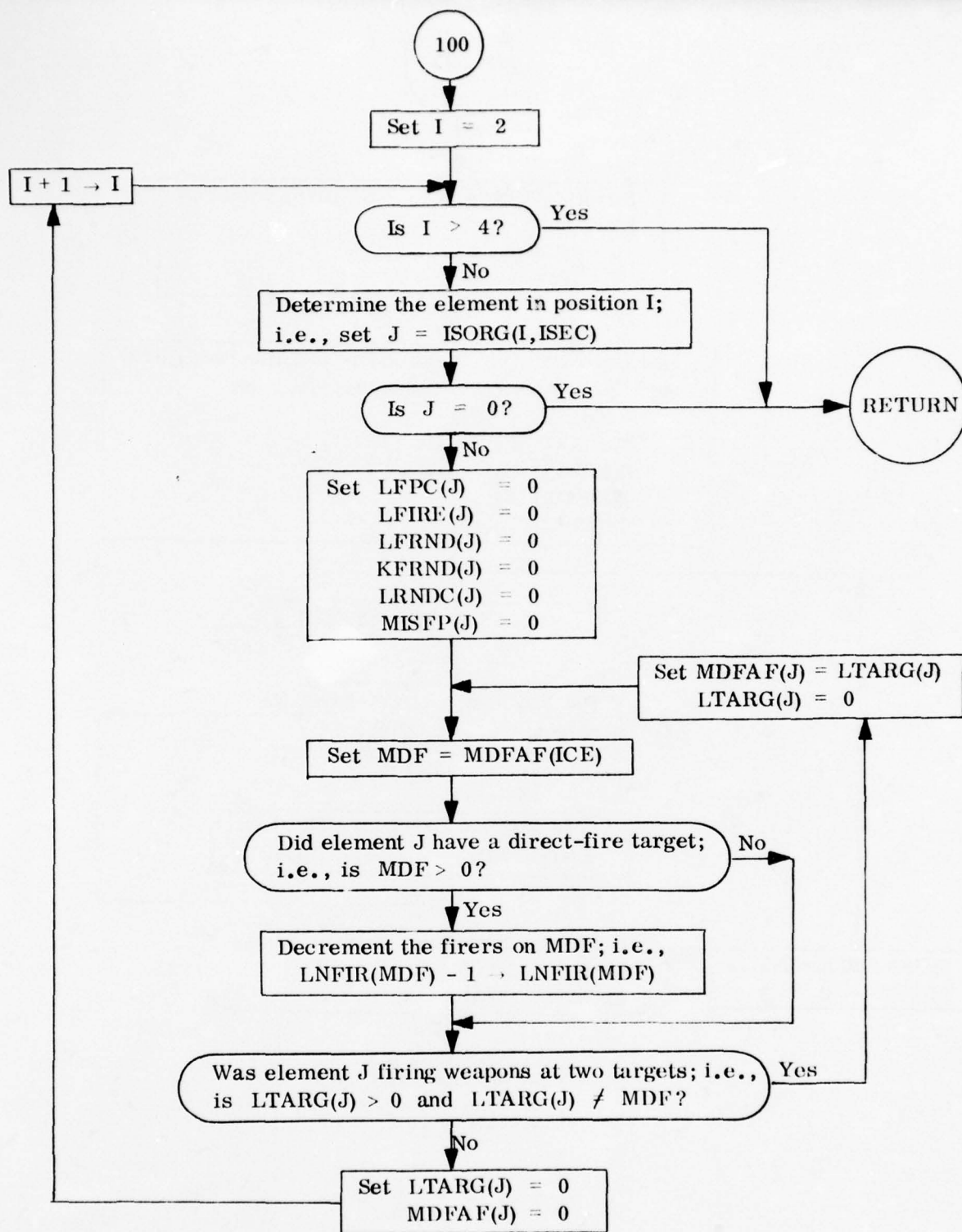
| | | |
|--------|-------|-------|
| ICECOM | LFIRE | LRNDC |
| ISFPC | LFPC | LTARG |
| ISORG | LFRND | MDFAF |
| KFRND | LNfir | MSFP |

SUBROUTINES REQUIRED:

None



Subroutine DELETH: Deleting an Aerial Section's Targets



Subroutine DELETH: Continued

Subroutine DETH^{1,2}

PURPOSE: Subroutine DETH first determines the probability of an aerial target being detected by a ground element during the ground element's previous event, and then utilizes a Monte Carlo procedure to determine whether or not a successful detection occurred.

CALLING SEQUENCE:

CALL DETH (ELEM,W)

where

ELEM = Target Element Number

W = Angle (in the horizontal plane) between the positive X direction and the direction vector (the longitudinal axis) of the aerial platform.

RESTRICTIONS: None

COMMON AREAS REFERENCED:

| | | |
|--------|-------|--------|
| AVA | LDET | THETA0 |
| DETTSQ | EMICR | RF |
| EGCOM | INTEL | SKY |
| ICECOM | | |

SUBROUTINES REQUIRED:

| | | |
|--------|--------|--------|
| ELVATE | COS | EXP |
| ALOG | DETT | FRANUD |
| ATAN2 | DETSQ | SKYLIT |
| SIN | GQUAD1 | SQRT |
| CONC | SENDI | |

¹For a flow chart of subroutine DETH, see Land Combat Model, DYNCOM Programmer's Manual, Report RF 2376 FR 70-4A (U), Systems Research Group, The Ohio State University, Columbus, Ohio, April, 1970. This cover sheet is included only to reflect the new common areas referenced.

²A complete flow chart of subroutine DETH, including the revisions mentioned in footnote 1, appears in RF 3649 FR 74-1, Appendix D, page B-6R.

Subroutine DETT^{1, 2}

PURPOSE: Subroutine DETT determines the probability of detection of a ground element by the current element. After the probability of detection is calculated, the decision is made as to whether or not an enemy element is actually detected by using a Monte Carlo procedure.

CALLING SEQUENCE:

CALL DETT (TDEL, TEND, TBEG)

where

TBEG = clock time at beginning of current element's last event,

TEND = clock time at the end of current element's last event,

TDEL = total elapsed time during current element's last event.

COMMON AREAS REFERENCED:

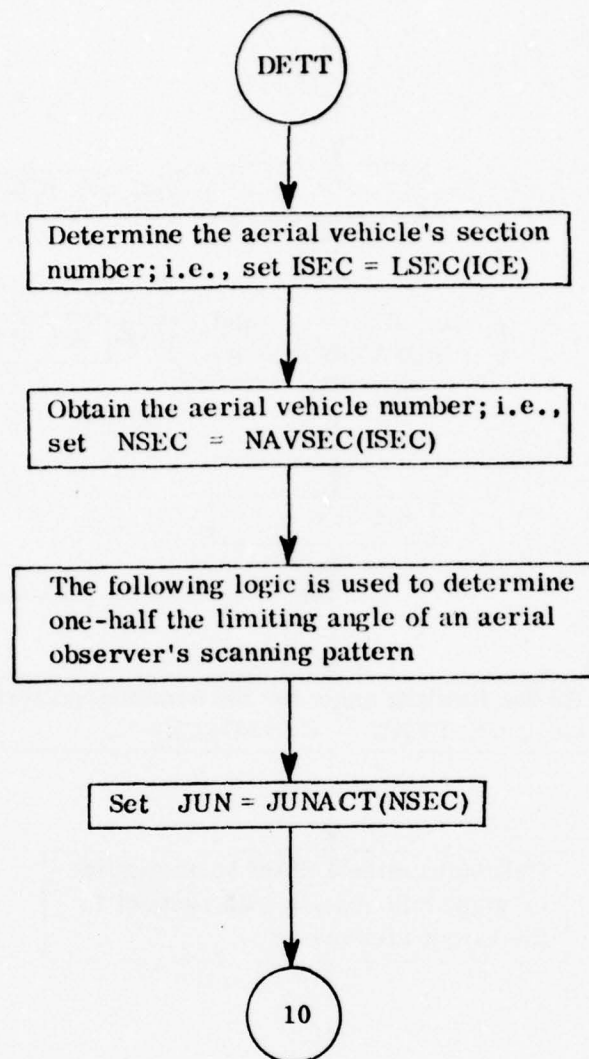
| | | | |
|--------|--------|-------|--------|
| CKANG | INTEL | LHICE | NAVSEC |
| DETTSQ | LDET | LSEC | THETA0 |
| EVBAR | JPHASE | LWCOD | |
| ICECOM | JUNACT | MDFAF | |

SUBROUTINES REQUIRED:

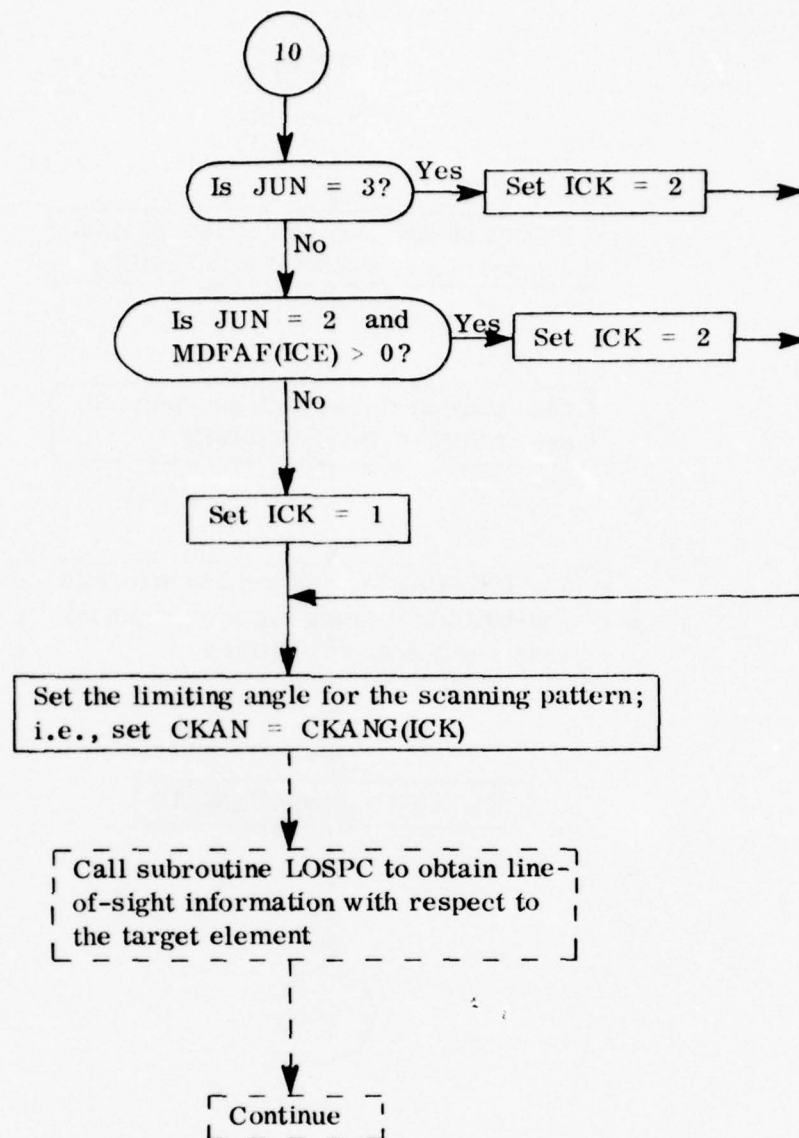
| | | | |
|-------|--------|-------|--------|
| ALOG | CVELD | LOSPC | TDES |
| ATAN2 | DETSQ | SENDI | TGAREA |
| CONC | EXP | SIN | |
| COS | FRANUD | SQRT | |

¹The accompanying flow chart represents only logic sections added during the contract period. The logic may be inserted at the very beginning of subroutine DETT as published in, Land Combat Model, DYNCOM Programmer's Manual, Report RF 2376 FR 70-4A (U), Systems Research Group, The Ohio State University, Columbus, Ohio, April, 1970.

²A complete flow chart of subroutine DETT, including the revisions mentioned in footnote 1, appears in RF 3649 FR 74-1, Appendix D, page B-15R.



Subroutine DETT: Detection of Ground Elements



Subroutine DETT: Continued

Subroutine DRFROK

PURPOSE: Subroutine DRFROK is called from subroutine FIRCON to determine whether an element presently without a direct-fire assignment should be allowed to select a direct-fire target.

CALLING SEQUENCE:

CALL DRFROK(IOK)

where

$$\text{IOK} = \begin{cases} 1 & \text{if element is allowed to select} \\ & \text{a direct-fire target, and} \\ 0 & \text{otherwise} \end{cases}$$

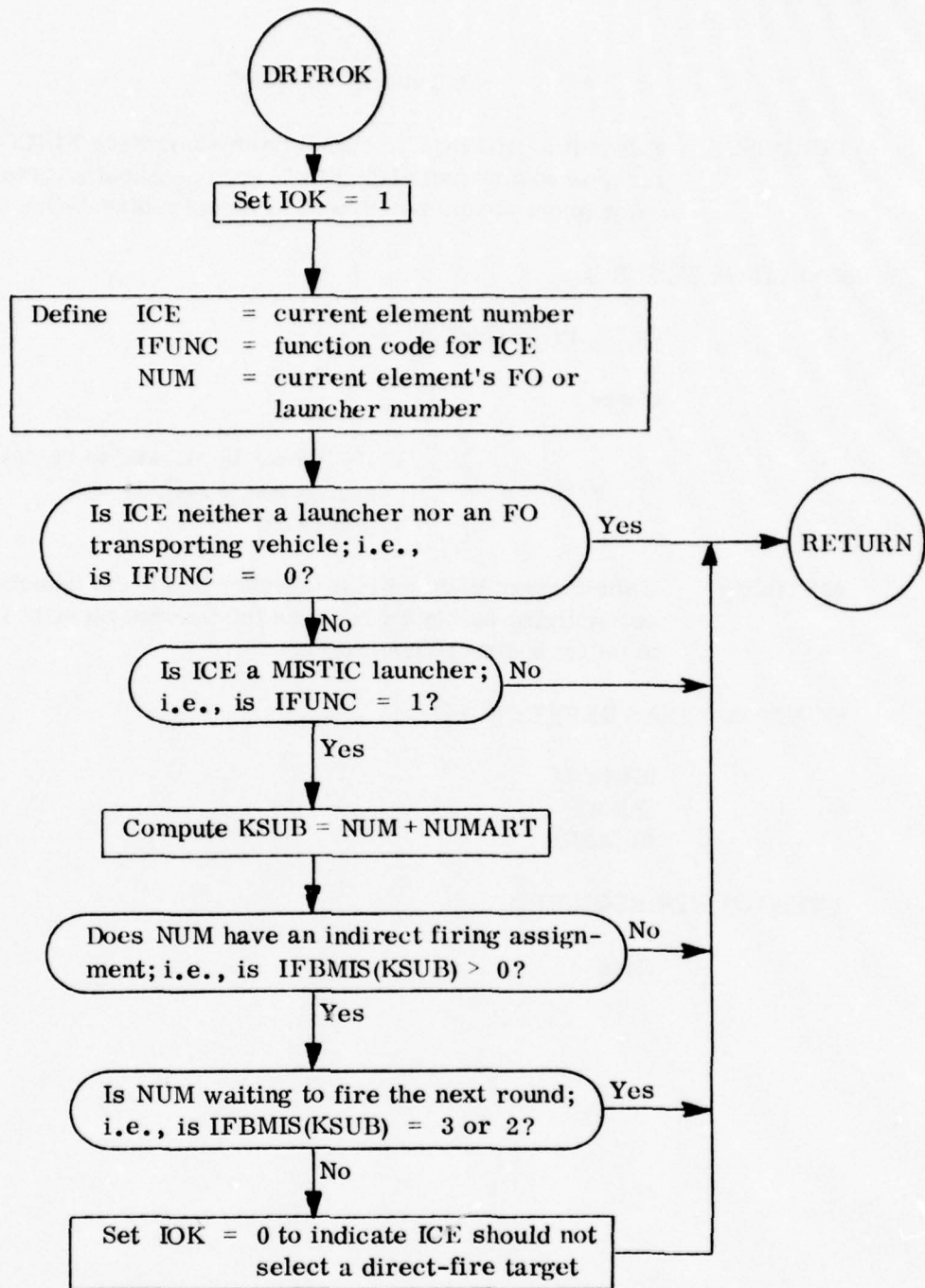
METHOD: If the current element is a launcher and if the launcher is presently firing indirect fire, then the current element is not allowed to select a direct-fire target.

COMMON AREAS REFERENCED:

ICECOM
IFBMIS
NUMBER

SUBROUTINES REQUIRED:

None



Subroutine DRFROK: MISTIC Launcher Direct-Fire Activity Control

Function ELVATE

PURPOSE: Function ELVATE returns the macro-terrain elevation at a point on the battlefield or the macro-terrain elevation plus the altitude above the terrain for an aerial vehicle.

CALLING SEQUENCE:

$Z = \text{ELVATE}(X, Y, IC)$

where

X and Y are the battlefield coordinates in meters
(floating)

IC represents the element number for which the elevation is desired. When not finding information about an element, set IC equal to zero

Z is output and gives the elevation in meters (floating)

RESTRICTIONS: Points outside the battlefield will return meaningless results.

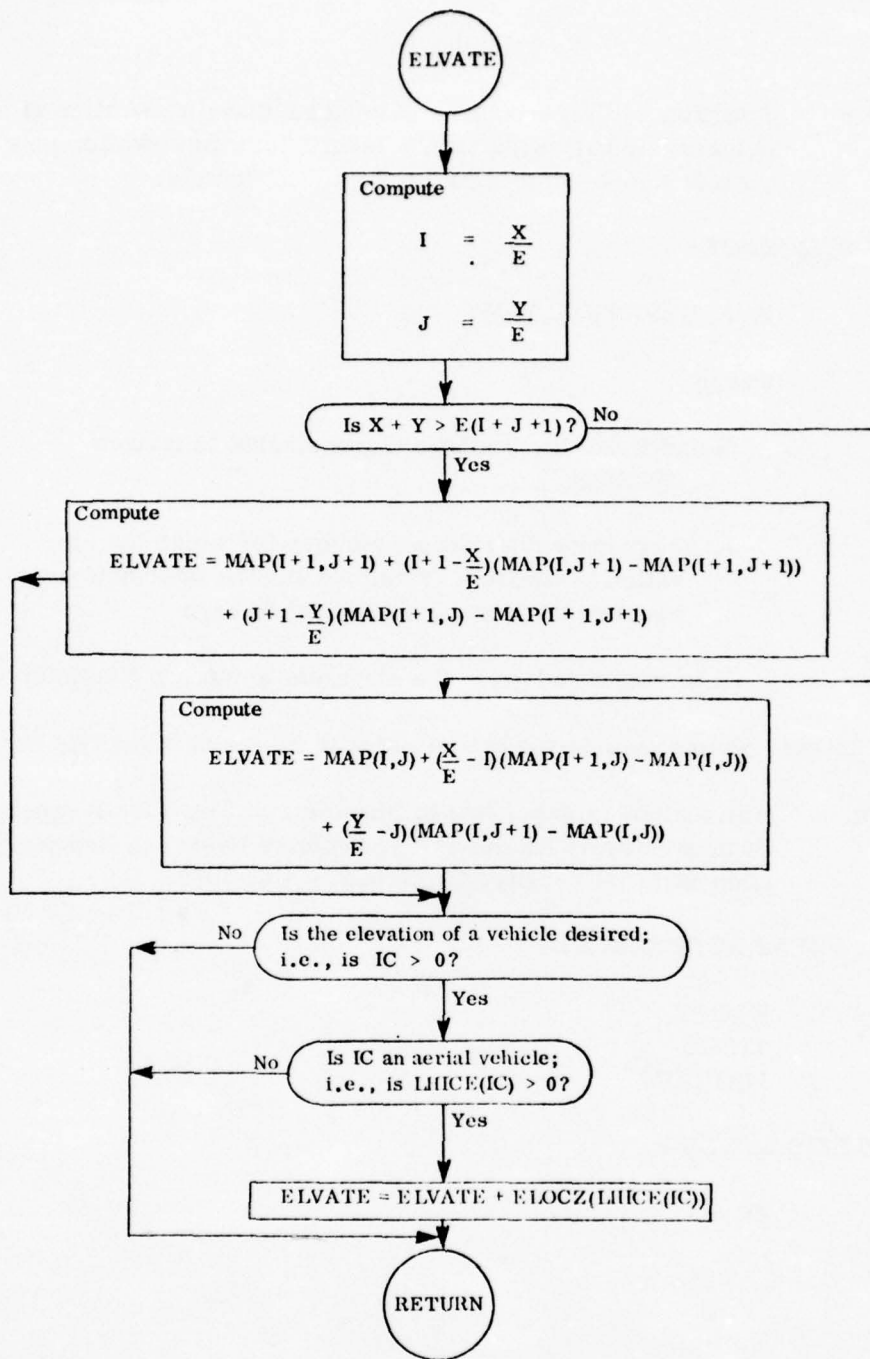
METHOD: The method is described in Chapter 2 of The Tank Weapon System, Report AR 69-2A(U), Systems Research Group, The Ohio State University, Columbus, Ohio, 1969.

COMMON AREAS REFERENCED:

ELOCZ
LHICE
MAPCOM

SUBROUTINES REQUIRED:

None



Function ELVATE: Compute Macro-Terrain Elevation

Subroutine FINAL

PURPOSE: Subroutine FINAL determines 1) whether a missile acquires its target and 2) the results of the tracking phase of the flight, given that acquisition occurs, for the semi-active missile system.

CALLING SEQUENCE:

CALL FINAL(KILL, MISKIL)

where

KILL = target kill code resulting from a hit;

MISKIL = $\begin{cases} 1 & \text{missile has hit target} \\ 2 & \text{otherwise} \end{cases}$

RESTRICTIONS: None

METHOD: See Chapter 2 of Volume 1 and Chapter 1 of RF 2376 FR 70-5 (S).

SUBROUTINES USED:

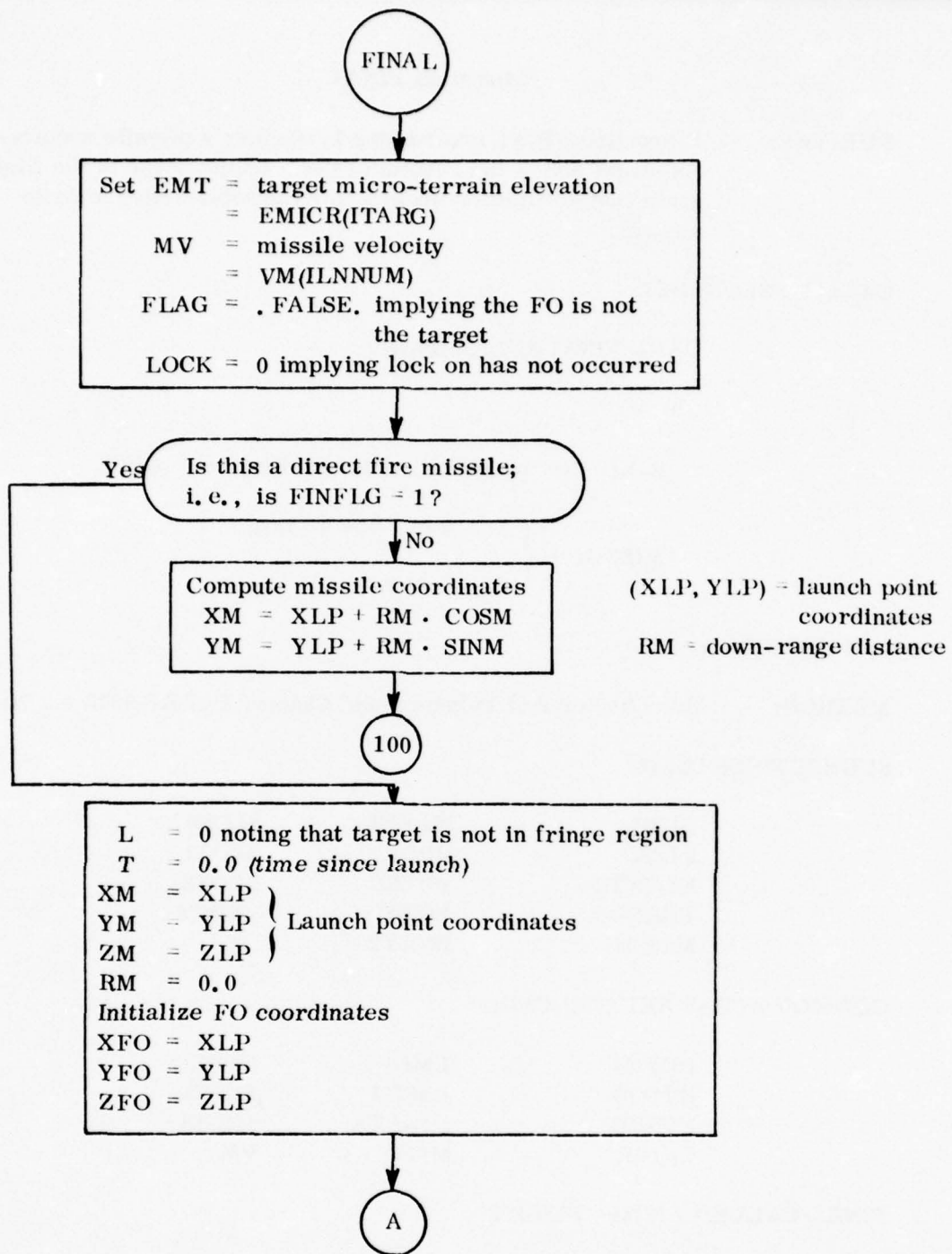
| | | |
|--------|-------|-------|
| DDSX | MPEEK | SLOSS |
| ELOC | PROB | SPOT1 |
| ELVATE | PULSE | SPOT2 |
| FRANUD | RGXY | VSPOT |
| MLETH | RGXYZ | |

COMMON AREAS REFERENCED:

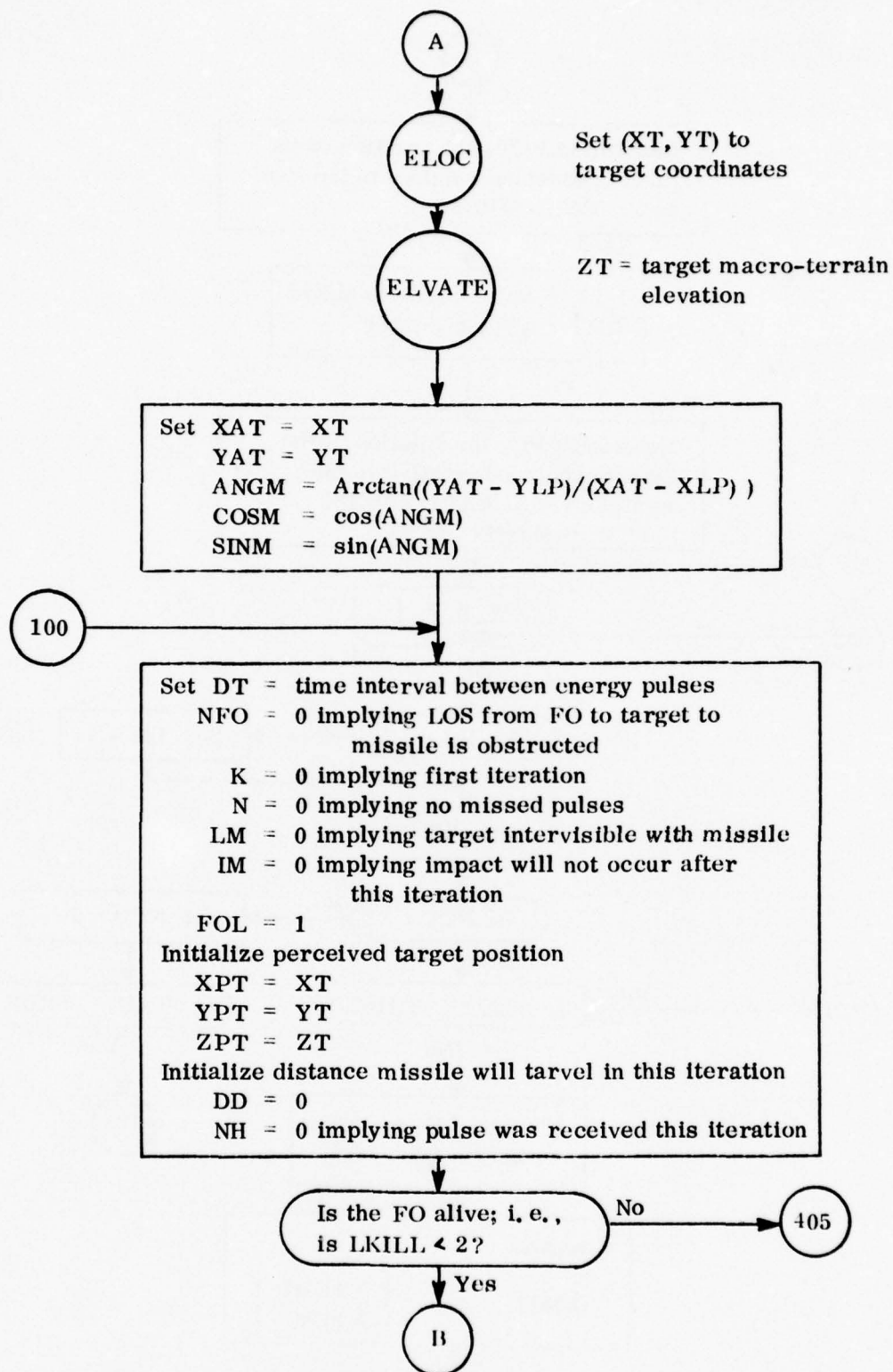
| | | |
|-------|--------|-------|
| DDPTS | LMOVF | OPEN |
| DTPTS | LNSET | RGPTS |
| EMICR | MIDATA | SRPTS |
| LKILL | MIFO | VM |

FINAL CALLED FROM: FLIGHT

STORAGE: 1690 words

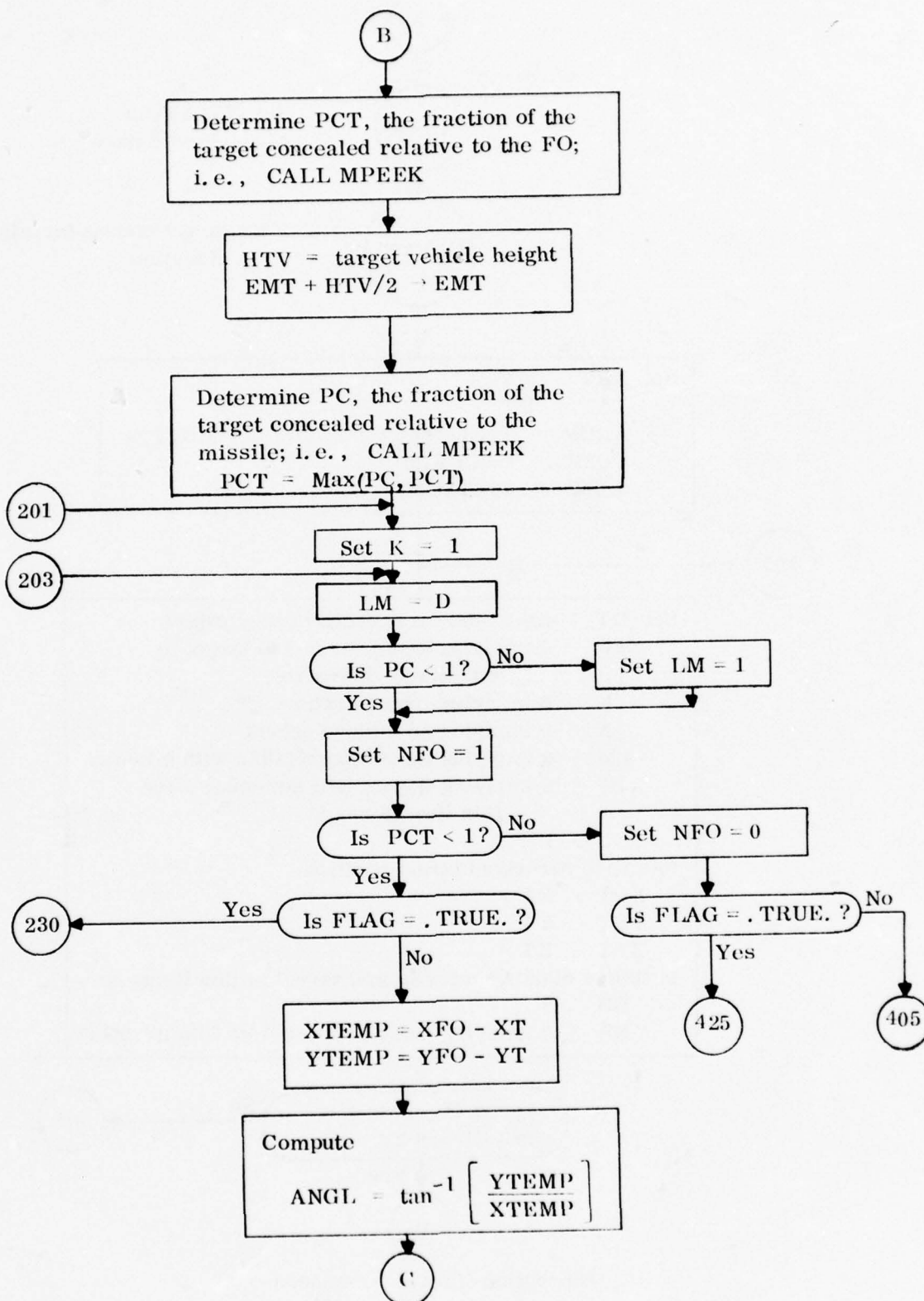


Subroutine FINAL: Acquisition and Tracking by a Missile



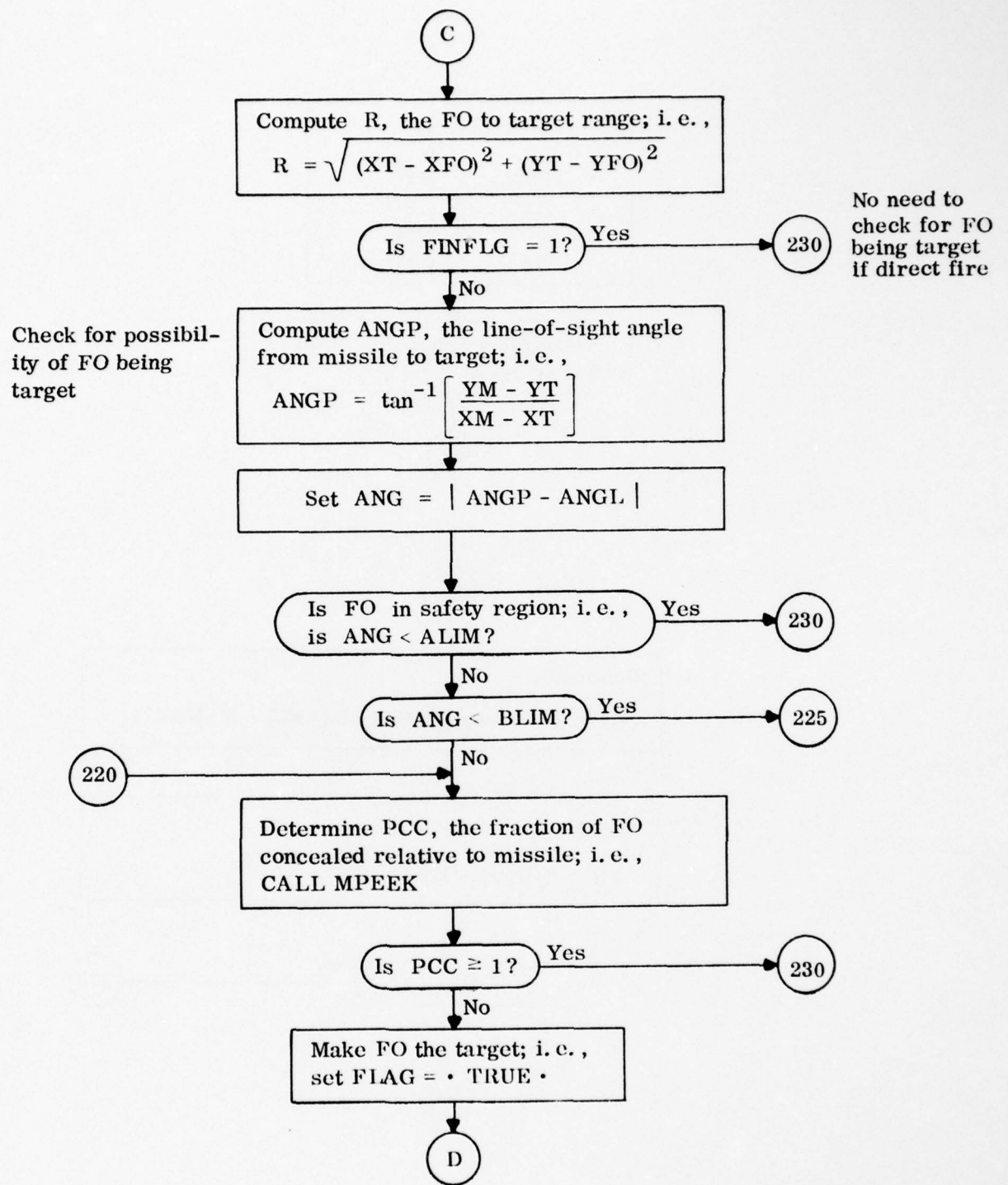
Subroutine FINAL: Continued

B-285

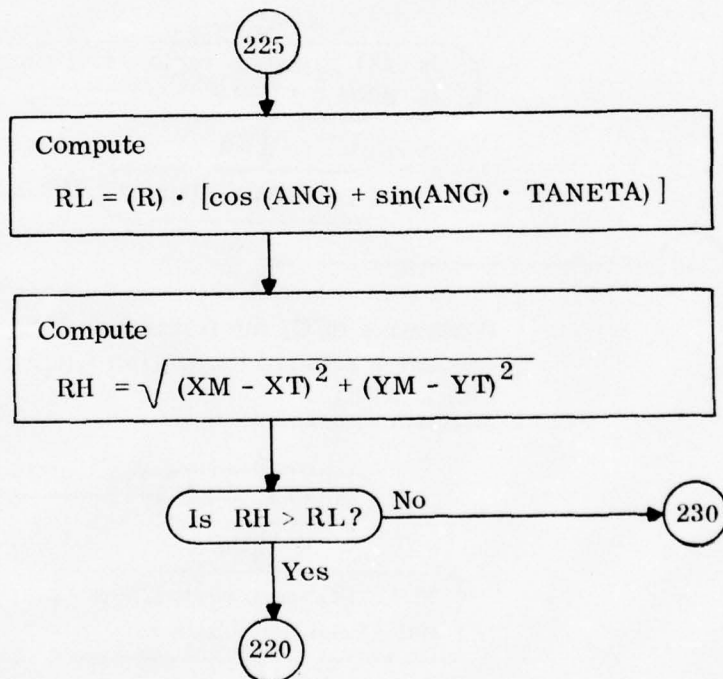
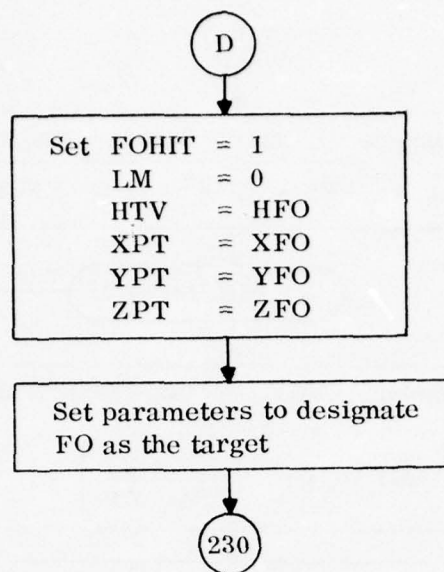


Subroutine FINAL: Continued

B-286



Subroutine FINAL: Continued



Subroutine FINAL: Continued

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Compute angle between a line from FO to target and target direction of motion

$$\text{THETA} = | \text{ANGT} - \text{ANGL} |$$

Compute angle between a line from FO to target and FO's direction of motion

$$\text{THETA} = | \text{ANGFO} - \text{ANGL} |$$

TM = time of missile launch

Determine VT and VFO, the target and FO velocities, respectively, at time, T + TM; i. e., CALL VSPOT

Compute VC, the crossing velocity in mils; i. e.,

$$\text{VC} = \frac{(1000) \cdot | \text{VFO} \cdot \sin(\text{THETA1}) - \text{VT} \cdot \sin(\text{THETA}) |}{\text{R}}$$

Calculate the slant range (SR) from the missile to the target; i. e.,

$$\text{SR} = \sqrt{(\text{XM} - \text{XT})^2 + (\text{YM} - \text{YT})^2 + (\text{ZM} - \text{ZT})^2}$$

$$\text{SPR} = \text{SR}$$

Did the missile miss the last pulse; i. e., is N > 0?

$$\text{SPR} = \sqrt{(\text{XM} - \text{XPT})^2 + (\text{YM} - \text{YPT})^2 + (\text{ZM} - \text{ZPT})^2}$$

Set TEST = .FALSE.

Is FLAG = .TRUE.?

No

PROB

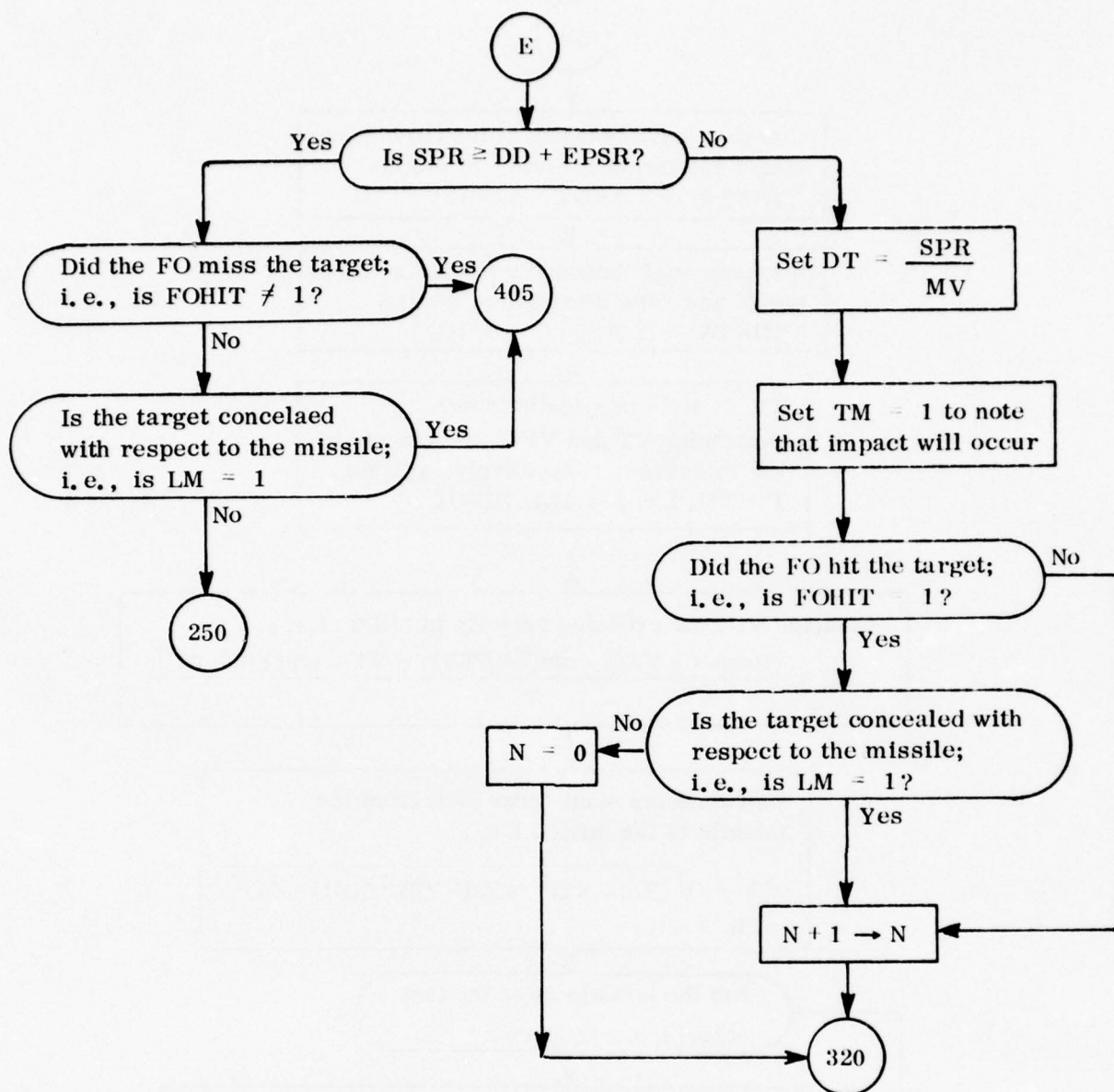
FOHIT is set to 1 if FO hit the target

Yes

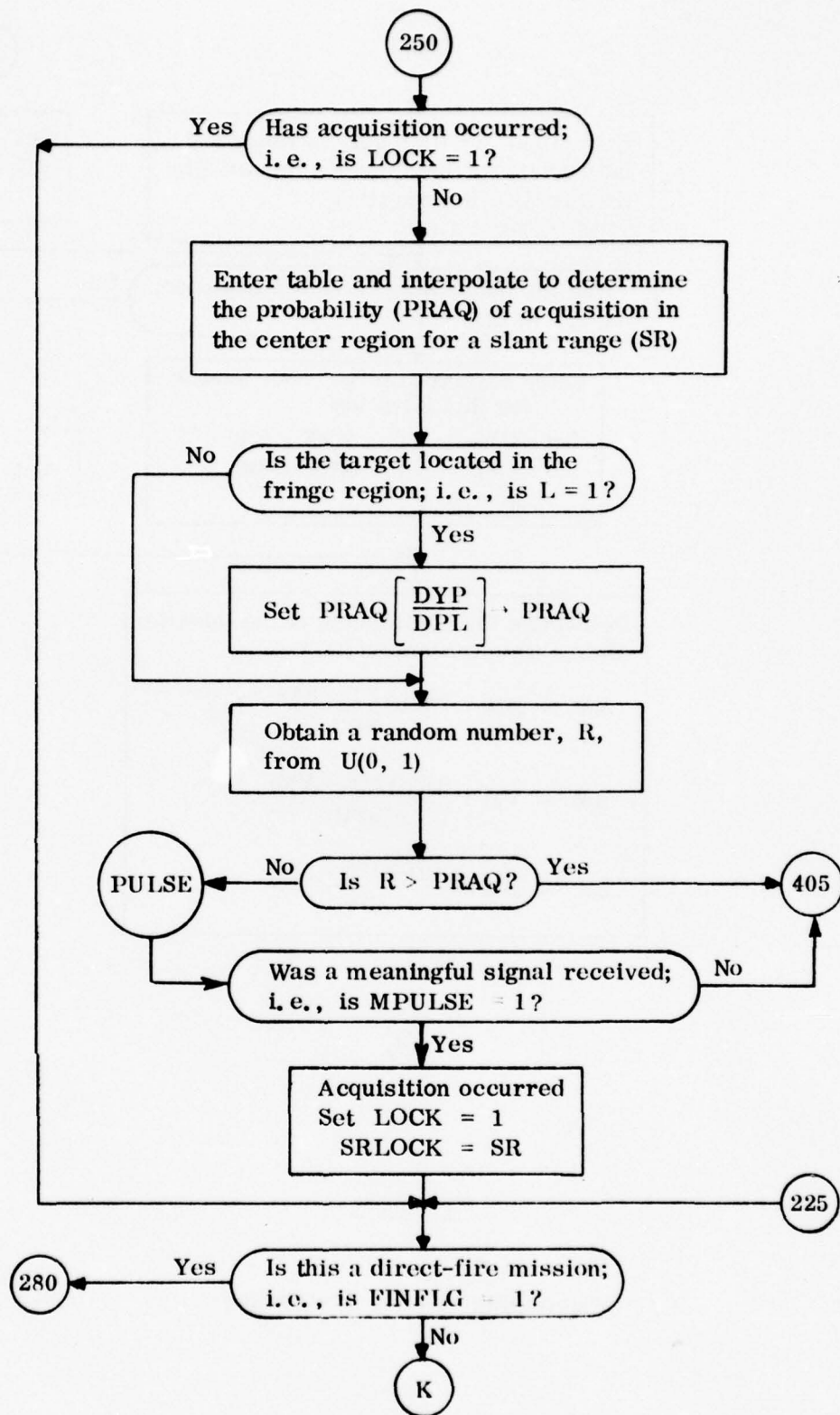
E

Subroutine FINAL: Continued

B-289

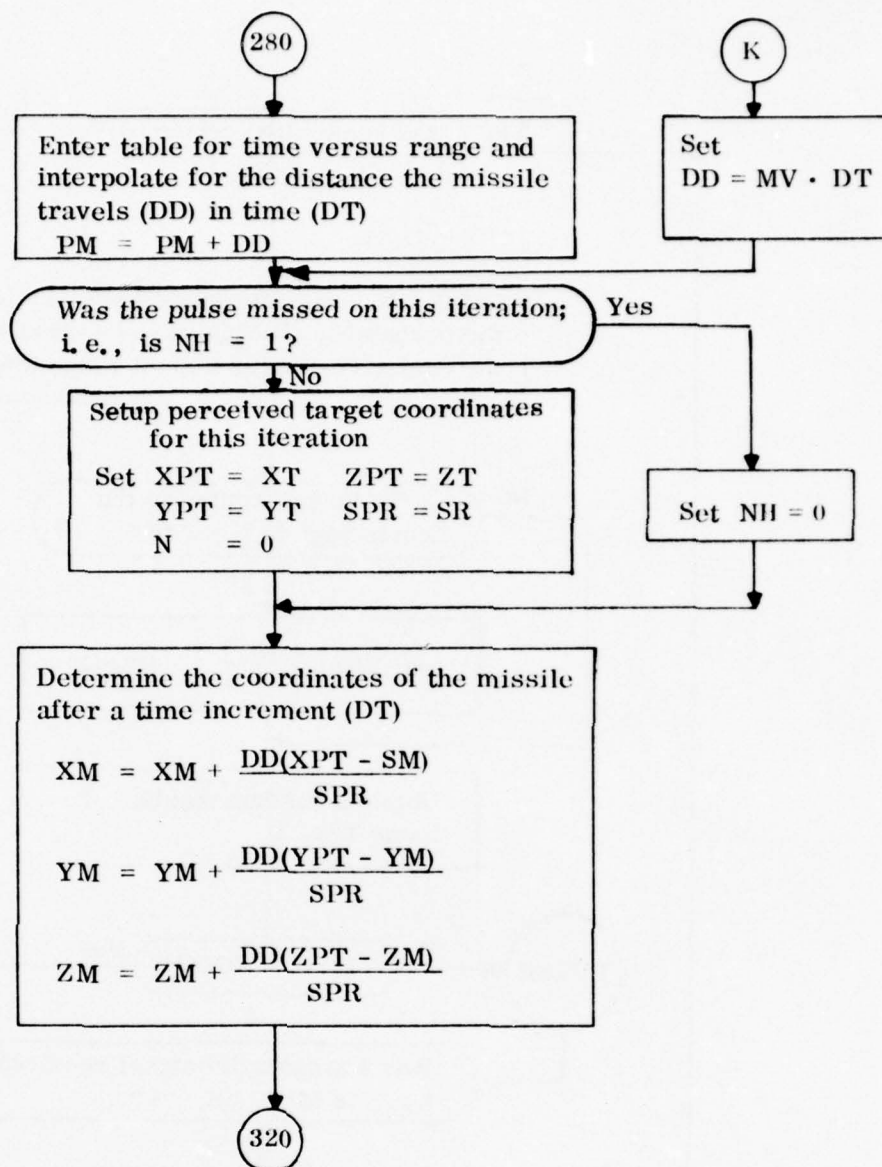


Subroutine FINAL: Continued

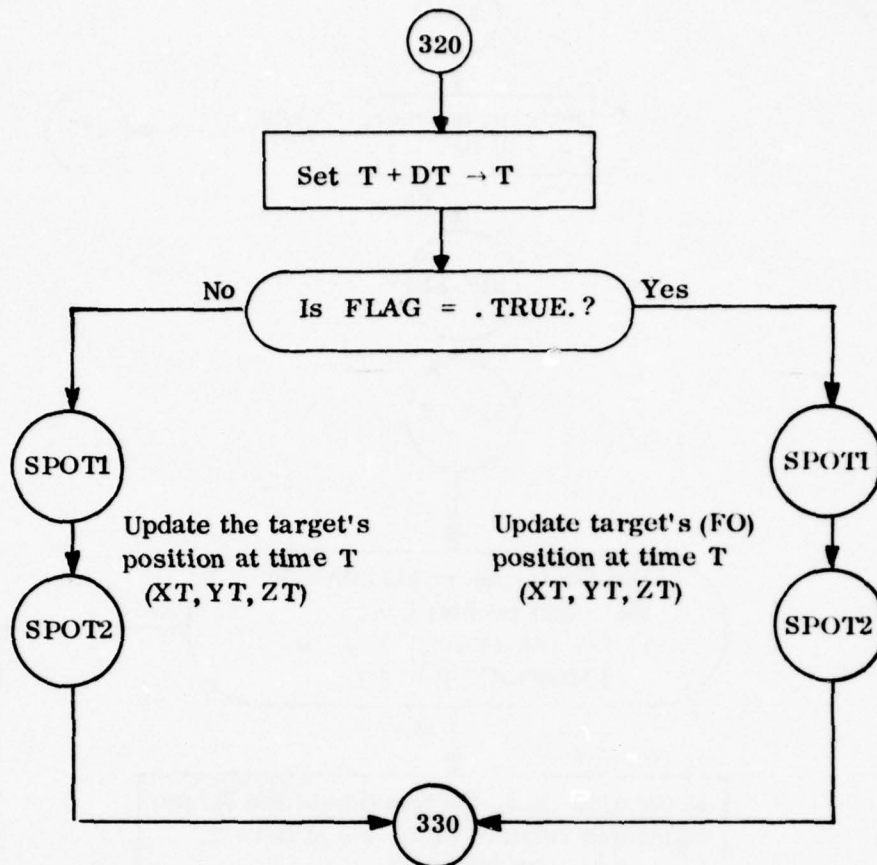


Subroutine FINAL: Continued

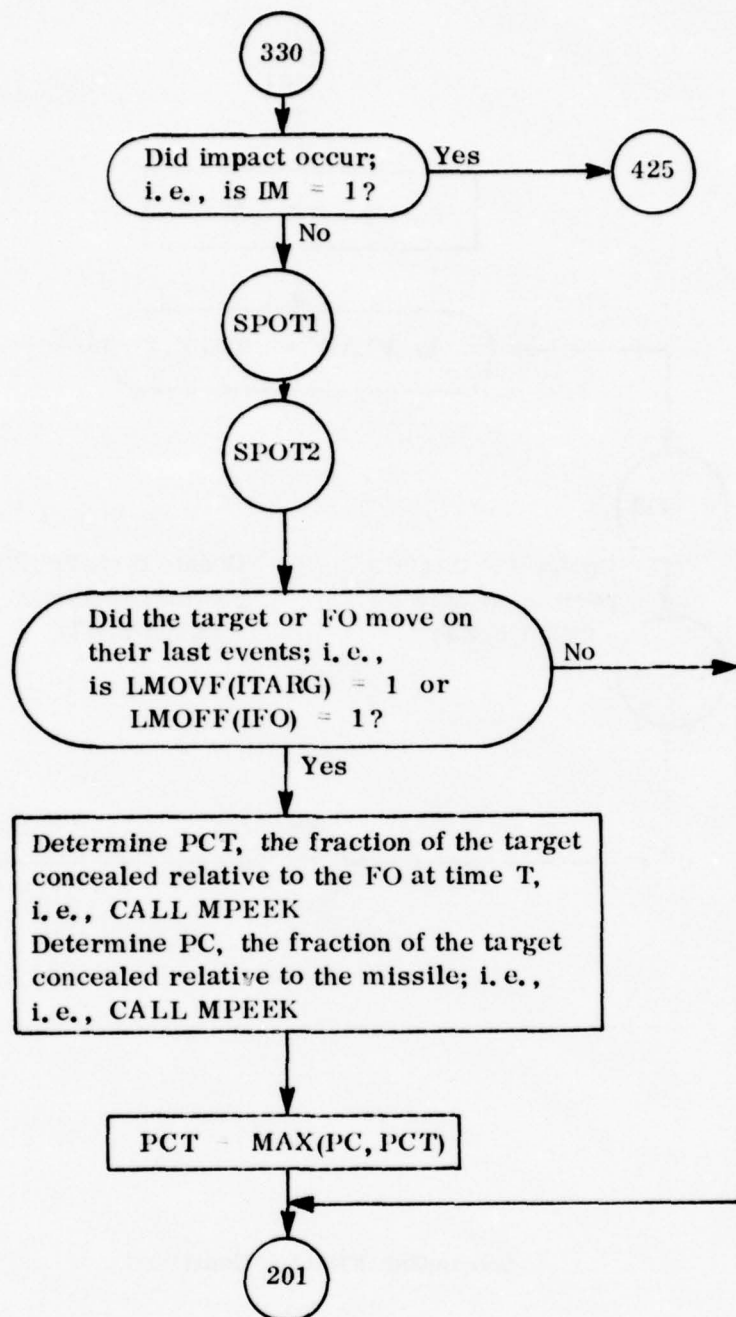
B-291



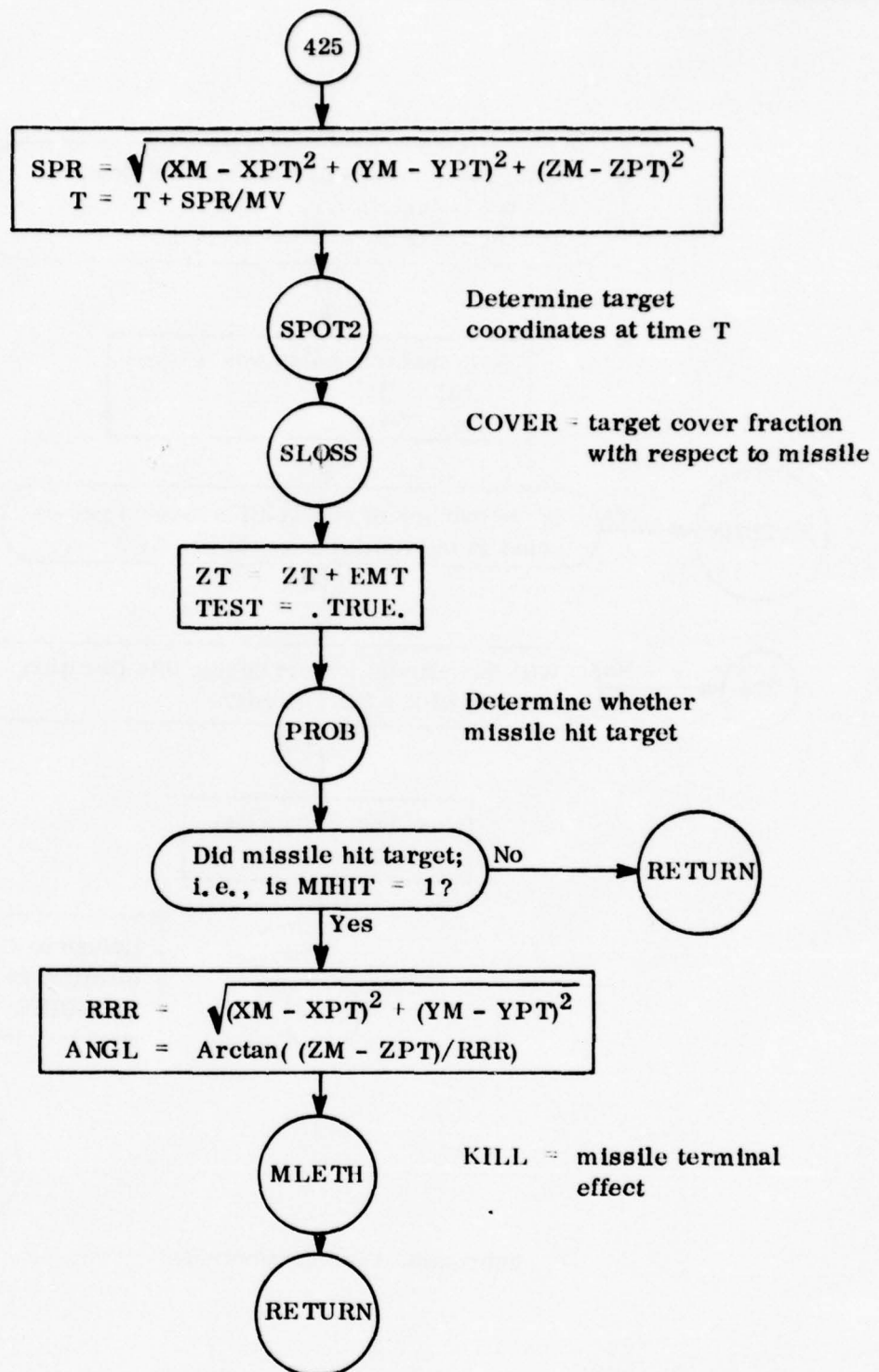
Subroutine FINAL: Continued



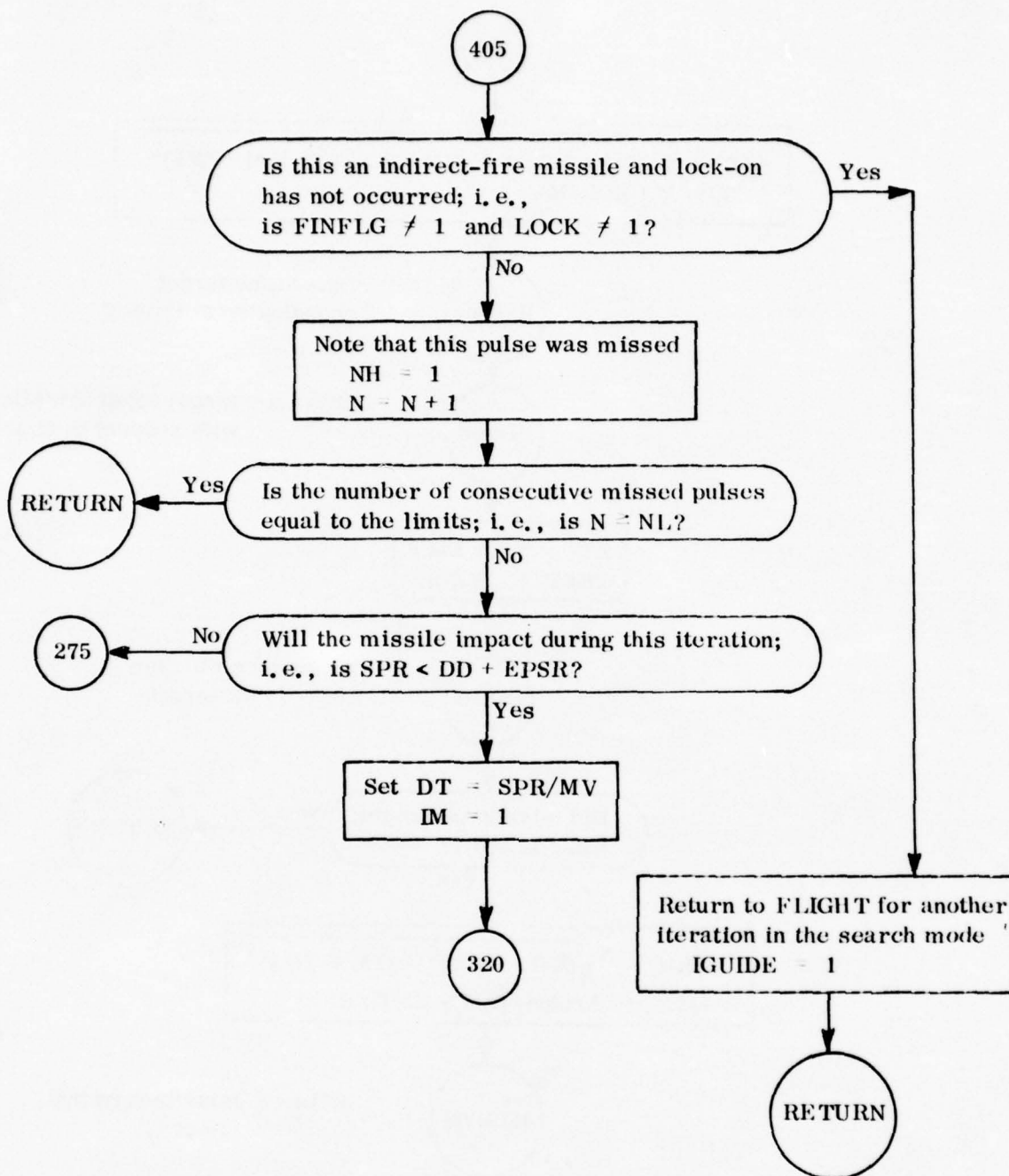
Subroutine FINAL: Continued



Subroutine FINAL: Continued



Subroutine FINAL: Continued



Subroutine FINAL: Continued

Subroutine FINALE

PURPOSE: Subroutine FINALE simulates the flight of an indirect-fire, electro-optical guided missile from lock-on to missile impact and determines the terminal effects of the missile flight.

CALLING SEQUENCE:

CALL FINALE(KILL, MISKIL)

where

KILL = target kill code resulting from a hit;

MISKIL = $\left\{ \begin{array}{l} 1 \text{ missile has hit target} \\ 0 \text{ otherwise} \end{array} \right.$

RESTRICTIONS: None

METHOD: See Chapter 2 of Volume 1 and Chapter 2 of RF 2376 FR 70-5 (S).

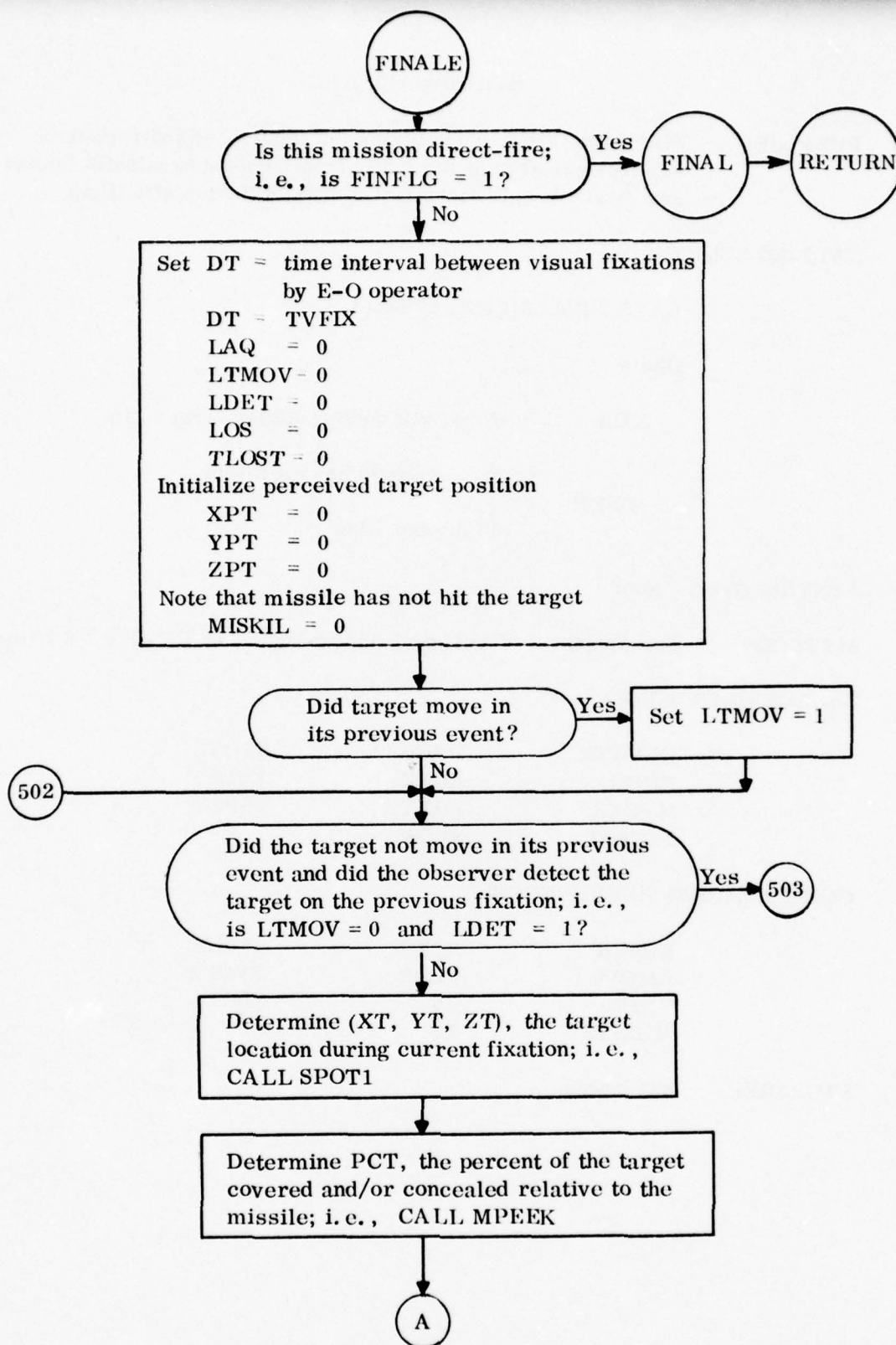
SUBROUTINES USED:

| | | |
|--------|--------|-------|
| ELVATE | PROBTV | SPOT1 |
| FINAL | RGXY | TVDET |
| MPEEK | RGXYZ | VSPOT |
| POSEST | SLOSS | |

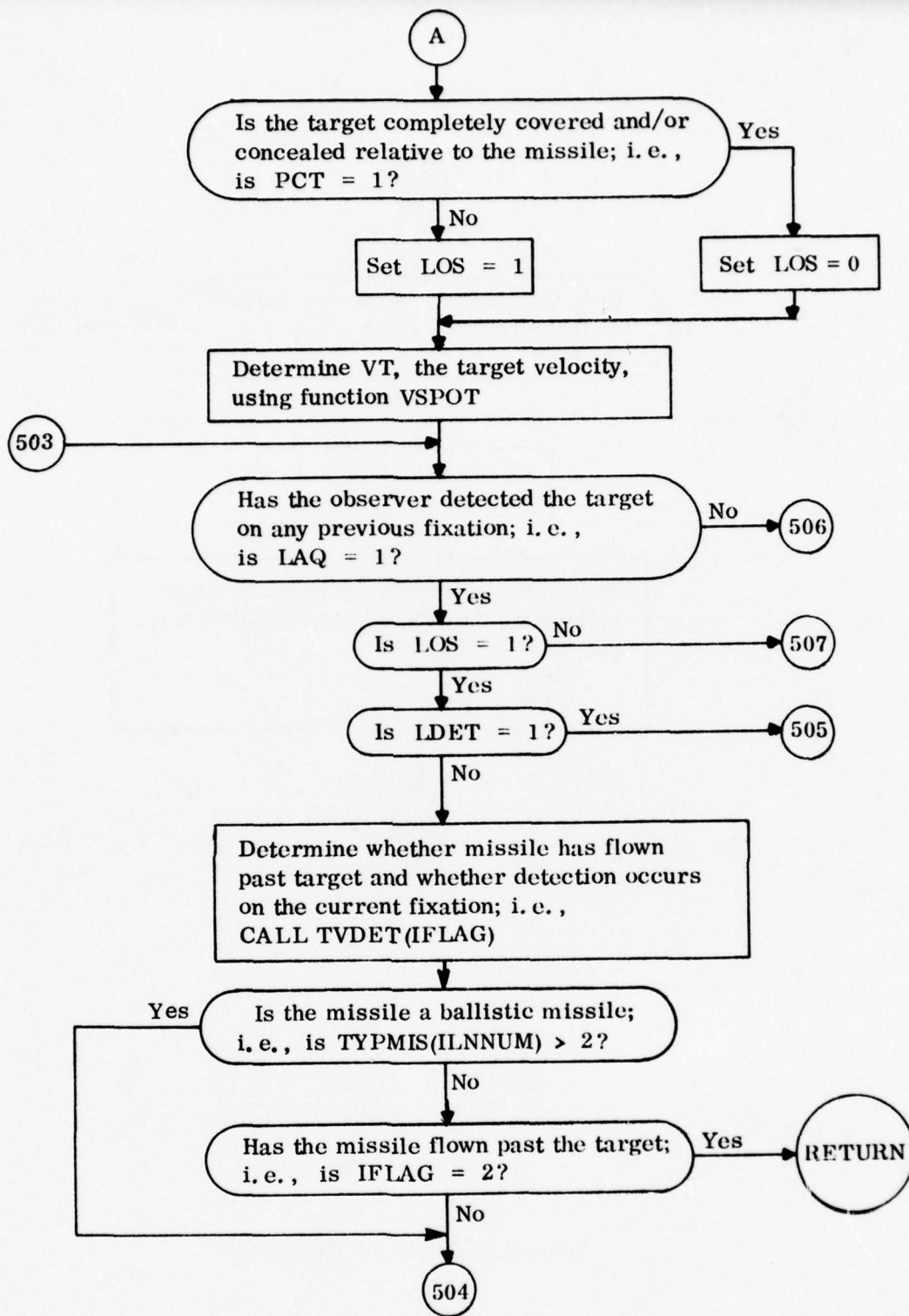
COMMON AREAS REFERENCED:

| | | |
|--------|------|-------|
| EMICR | MIFO | TVMIS |
| LMOVF | OPEN | TVOPT |
| LNSET | RM | ZM |
| MIDATA | RF | |

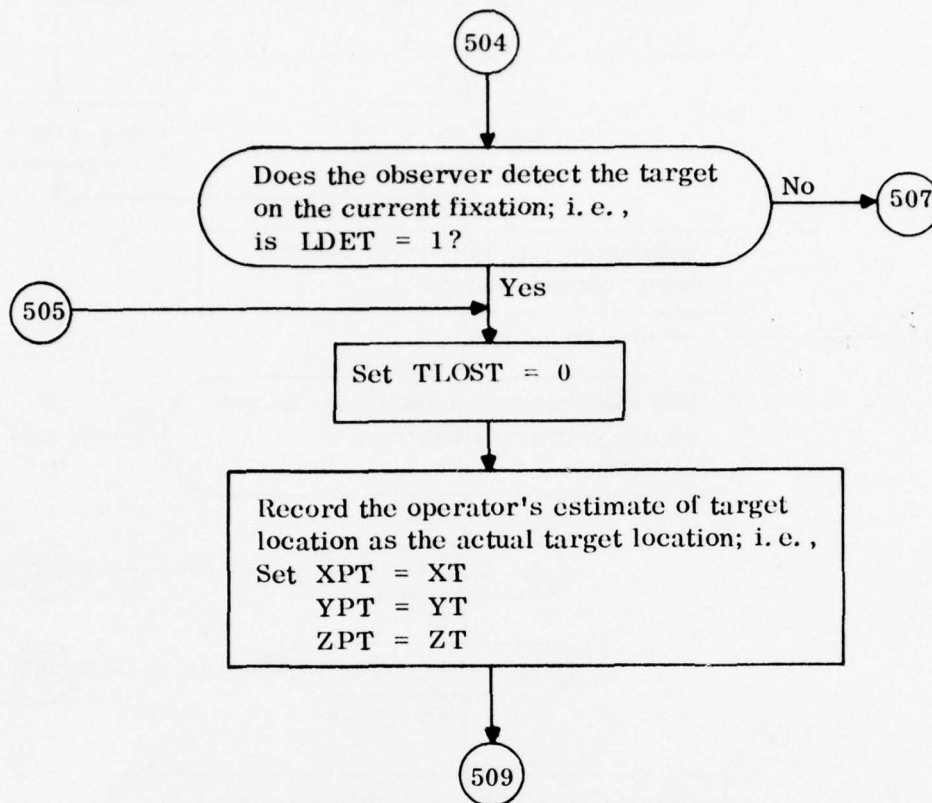
STORAGE: 821 words



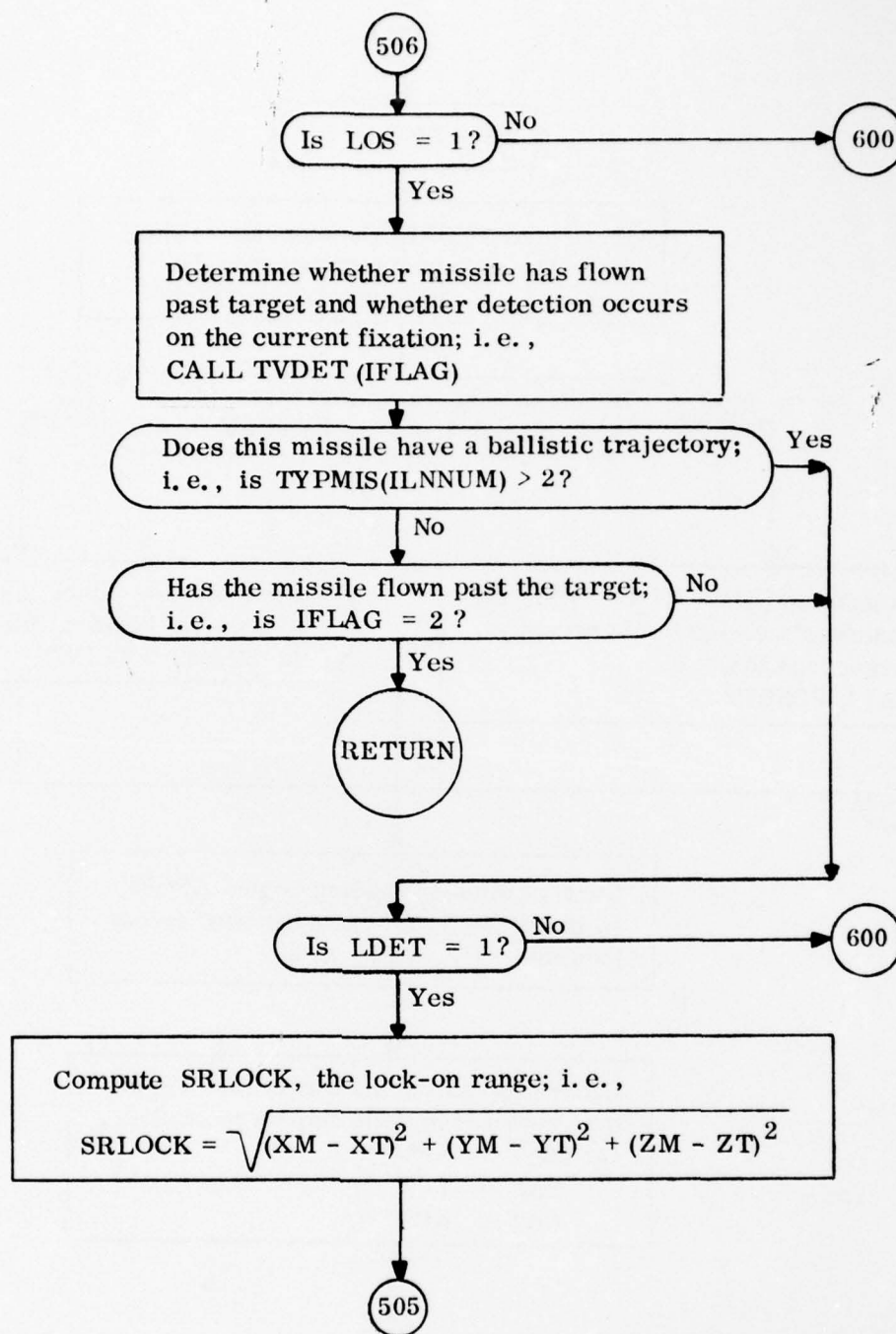
Subroutine FINALE: Flight and Terminal Effects Model--
E-O Missile System



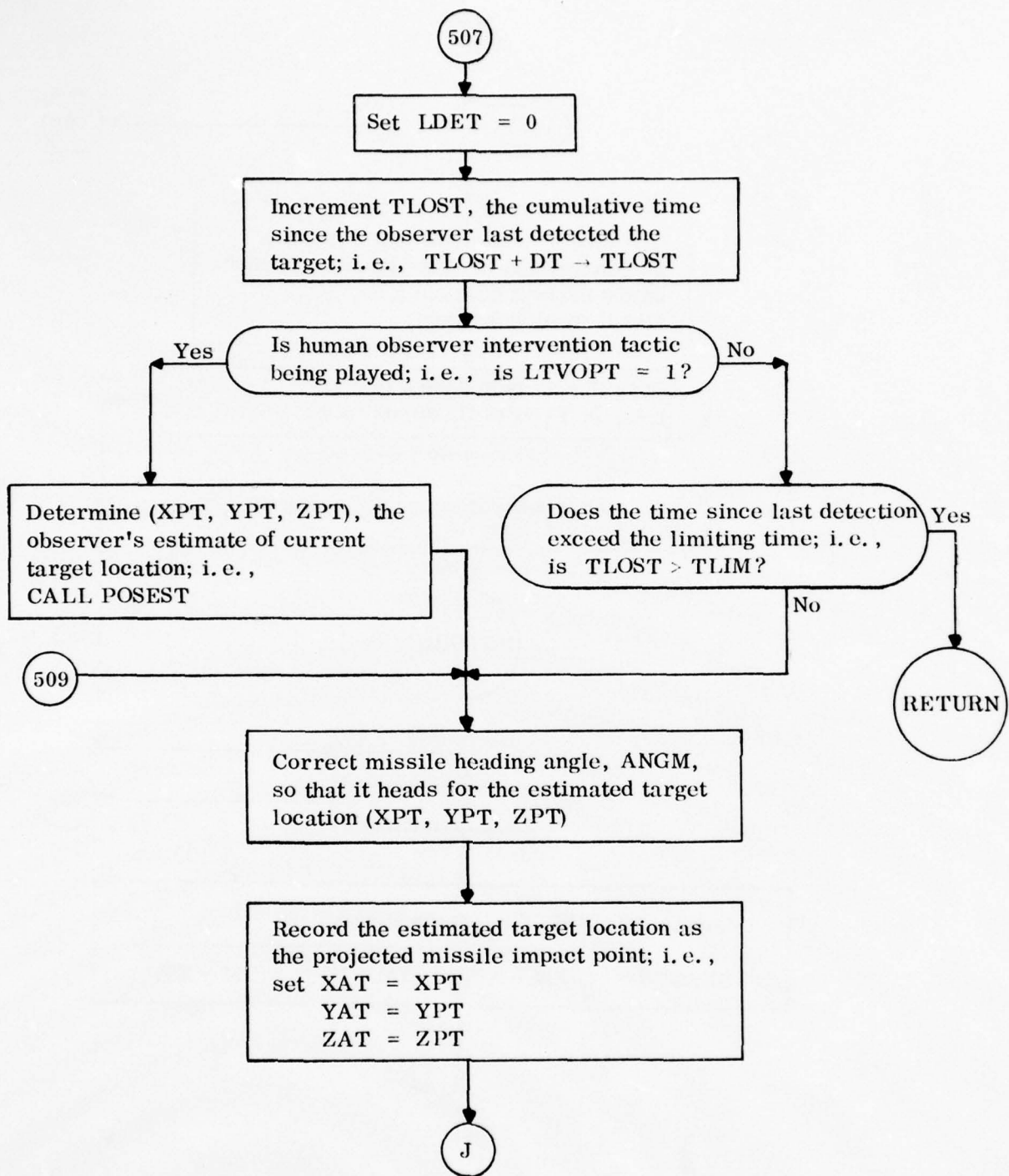
Subroutine FINALE: Continued



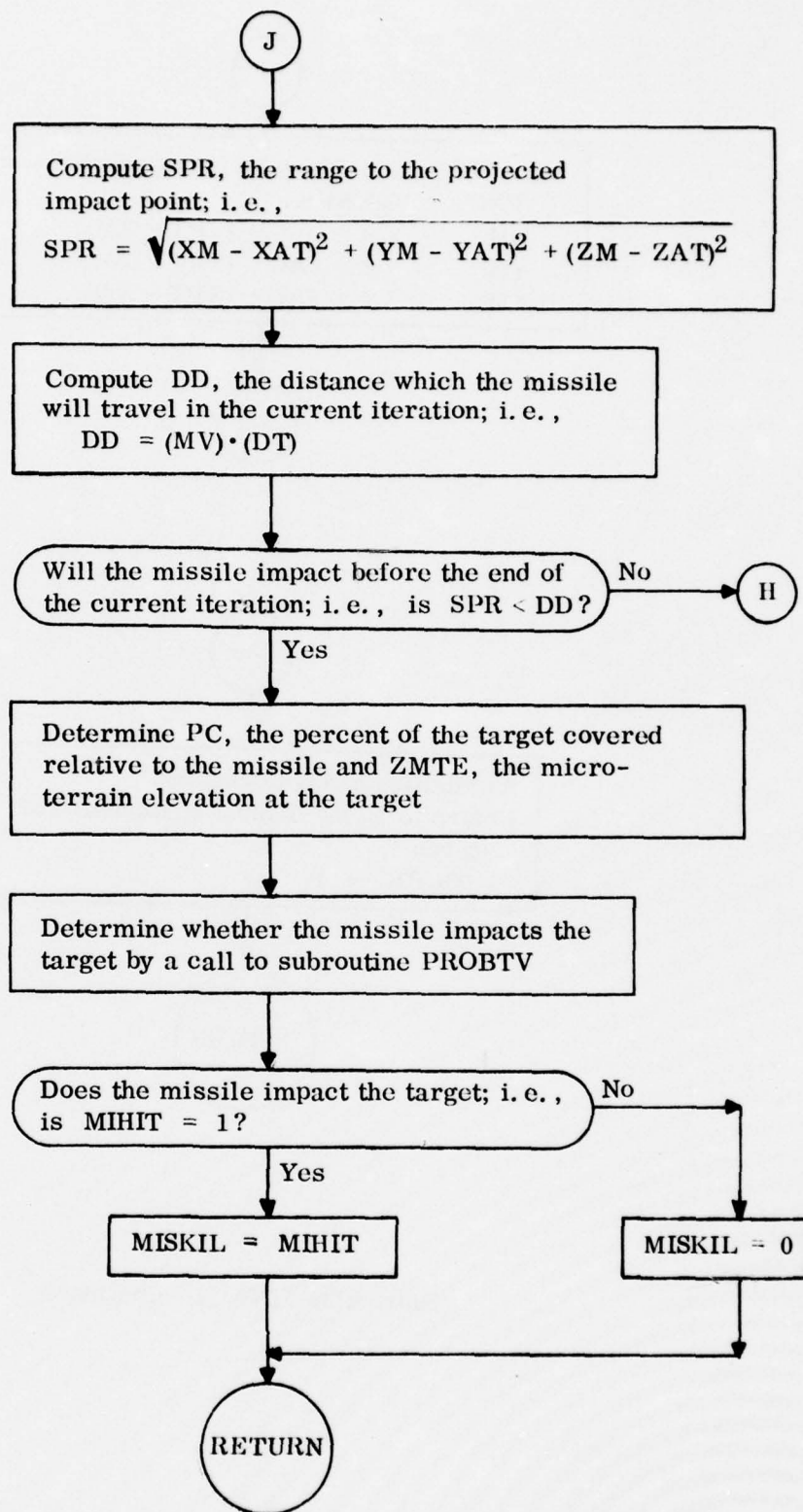
Subroutine FINALE: Continued



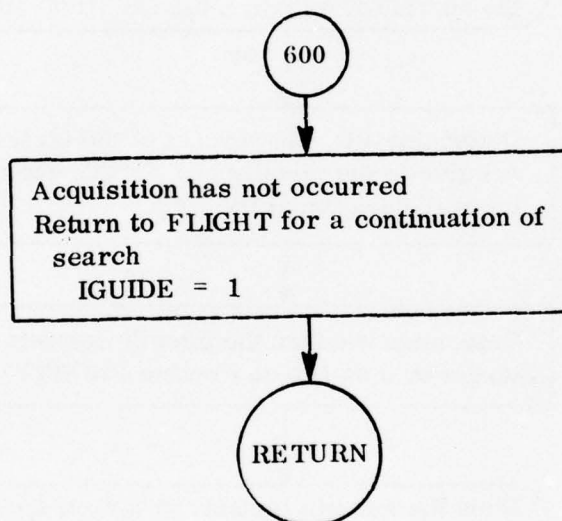
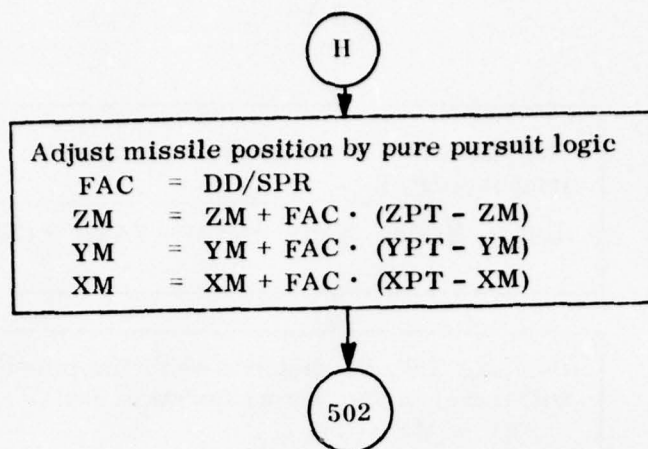
Subroutine FINALE: Continued



Subroutine FINALE: Continued



Subroutine FINALE: Continued
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Subroutine FINALE: Continued

Subroutine FIRCON

PURPOSE: Subroutine FIRCON is the Fire Controller Model. It assigns and deletes direct firing assignments, and it selects the projectile to be fired at the current element's targets. Also, FIRCON determines whether the fire can be delivered while moving or whether the current element's section should seek a stationary firing position.

CALLING SEQUENCE:

CALL FIRCON(MVFIR, LNCH)

where:

$$\text{MVFIR} = \begin{cases} 1 & \text{if this round cannot be fired while} \\ & \text{moving (integer)} \\ 0 & \text{otherwise} \end{cases}$$
$$\text{LNCH} = \begin{cases} 1 & \text{if a missile is to be launched this} \\ & \text{event (integer)} \\ 0 & \text{otherwise} \end{cases}$$

METHOD: See Chapter 9 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| DKR | ISACT | LFUNC |
| ECLOCK | IMIST | LHICE |
| EDIR | INART | LKILL |
| EFELC | IRFNH | LNUM |
| EMICR | ISFPC | LNFR |
| ESPD | ISORG | LMOVF |
| FIRCOM | KFIREV | LRNDC |
| IADCE | KFOD | LSEC |
| IADPM | KFRND | LTARG |
| IAMMO | KOBJ | LTHTNK |
| ICECOM | KRC | LWCOD |
| IDFMC | LCREW | LWSYS |
| IFBMIS | LCSWFN | MANTYP |
| IFOMI | LDET | MANLDR |
| IFRFL | LFLAG | MINE |
| IITPRB | LFRND | MISAVE |

MISION
MUOBJ
NM
NMISUN
NTELE
NUMBER
OBJX
OBJY
PALLOW

RAAS
RACT
RAFMNF
RAFMNL
RATE
RATF
RATFCE
RATT
RMVFR

SECANG
SEQPAR
SPDMU
TDFRDY
TGTDIM
THETA0
MDFAF

SUBROUTINES REQUIRED:

ADTGSL
AMMO
AMMOD
ARFO
CLOCK

DRFROK
ELOC
FIRCNT
FIRFOR

LOSPC
PRIOR
RGIJ
SNRC

FIRCON

Define ICE = current element's number
KILL = current element's casualty status
ISEC = current element's section number
X,Y = current element's position coordinates
KOLOR = current element's force code
IFPC = current element's fire position code
IFLE = firing event code for previous event
ITARG = target at which current element is firing

KODW = current element's weapon code
MANUN = current element's maneuver unit
IFUNC = current element's function code
NUM = current element's FO or launcher number

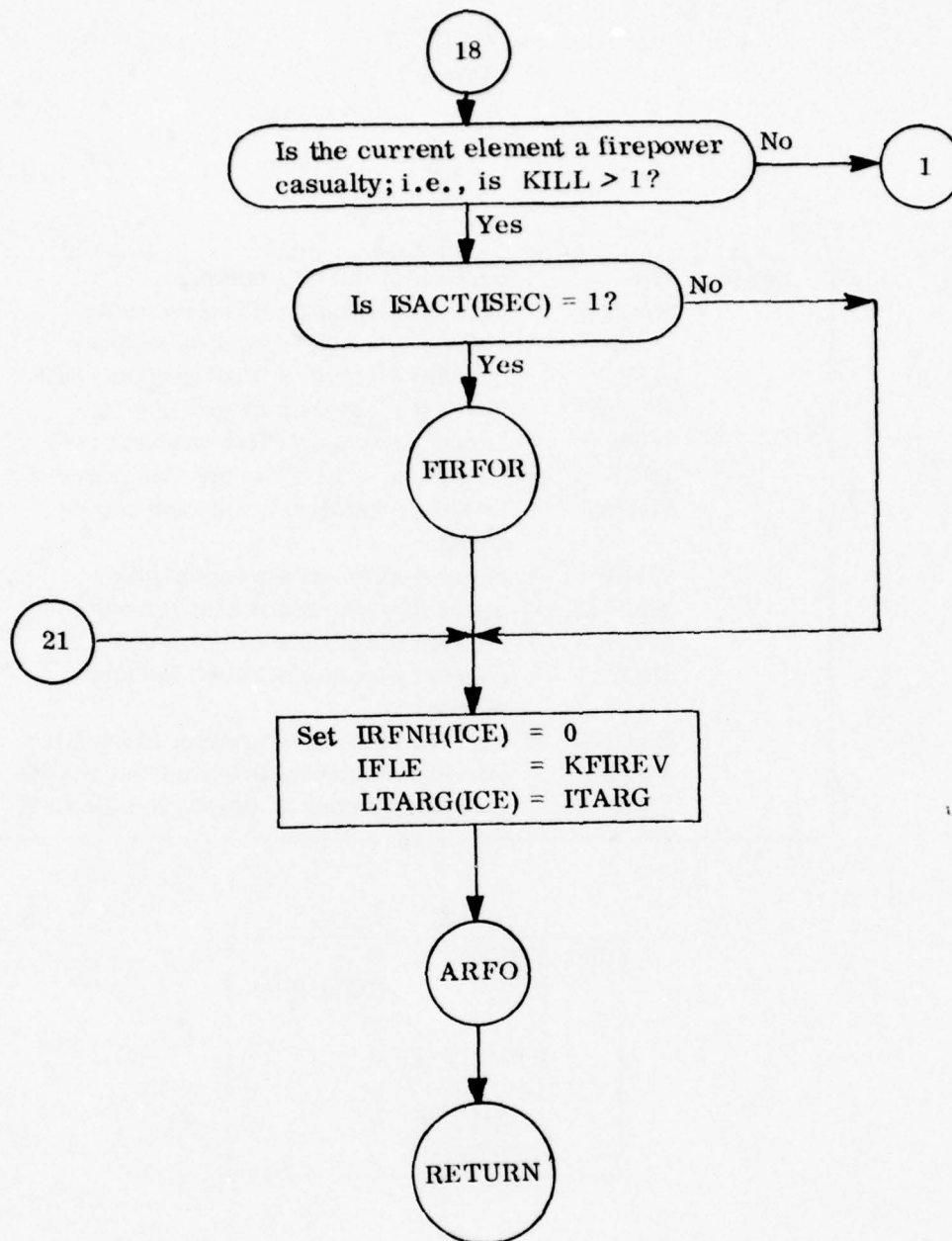
CLONK = current element's present clock time
TSUBM = current element's previous event time
LPNPT = element number of pinpointed element

Set KTEST = 0
KP1 = KOLOR + 1
MVFIR = 0
KFIREV = 0
LNCH = 0
IAMMO = 0
LFRDFR = 0

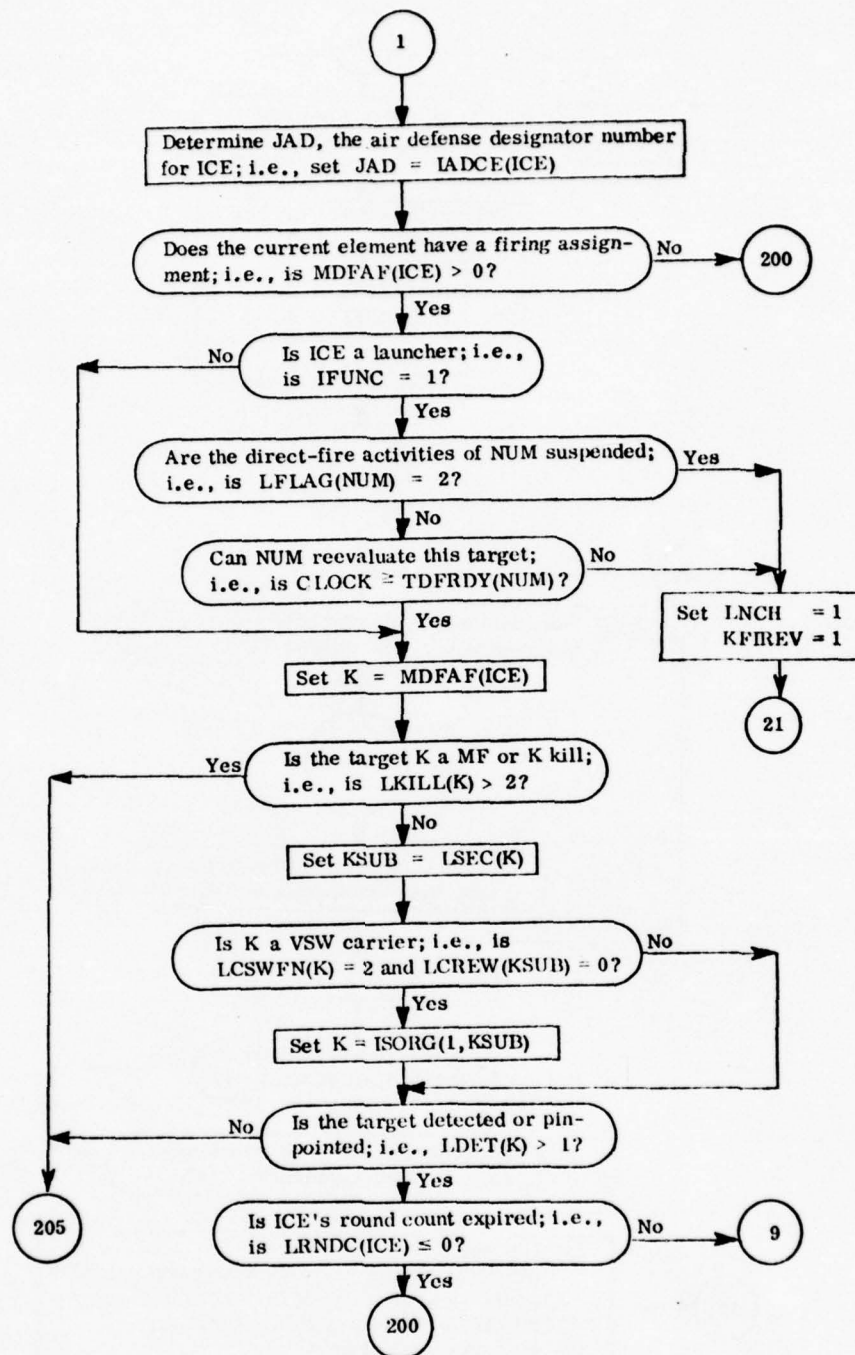
18

Subroutine FIRCON: Fire Controller

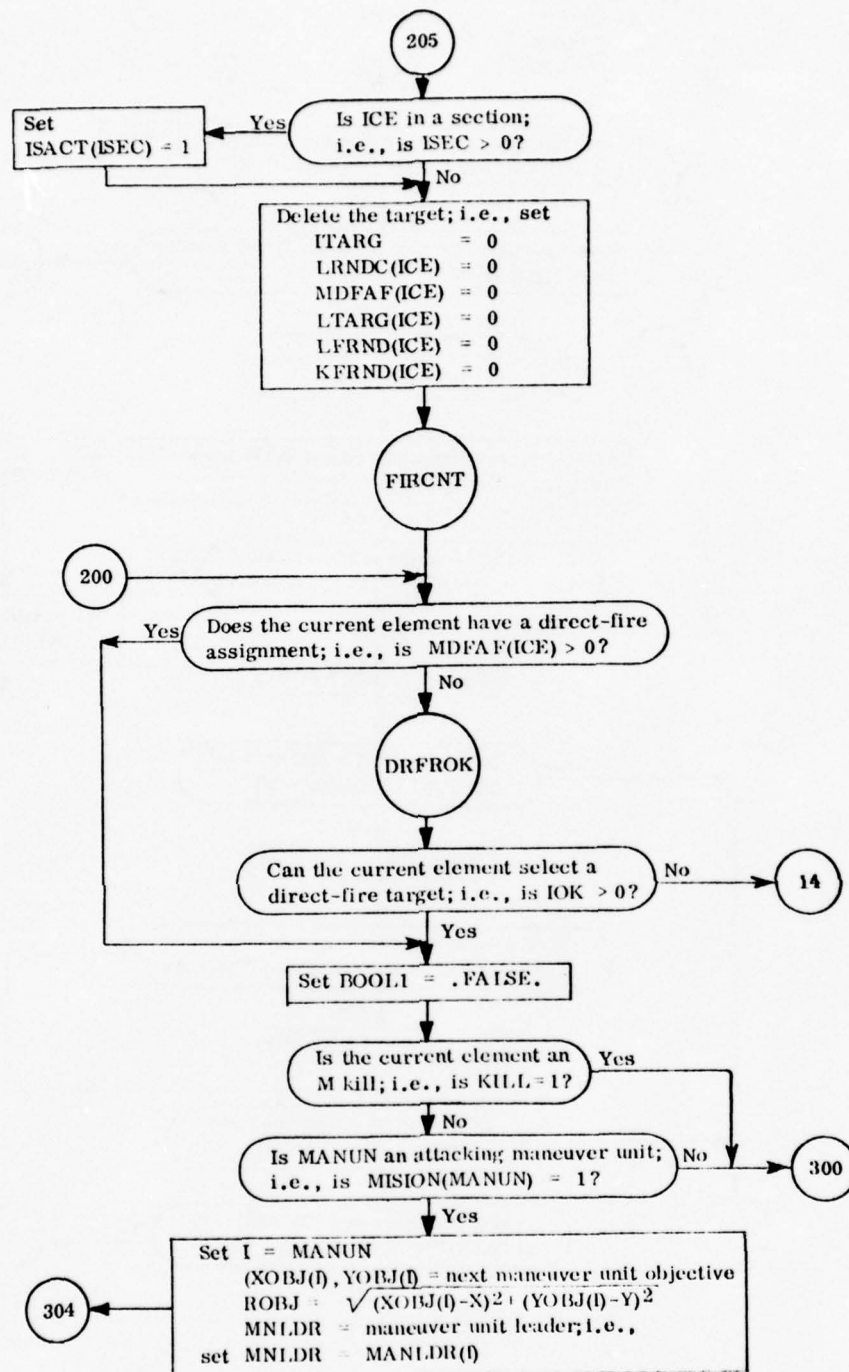
B-307



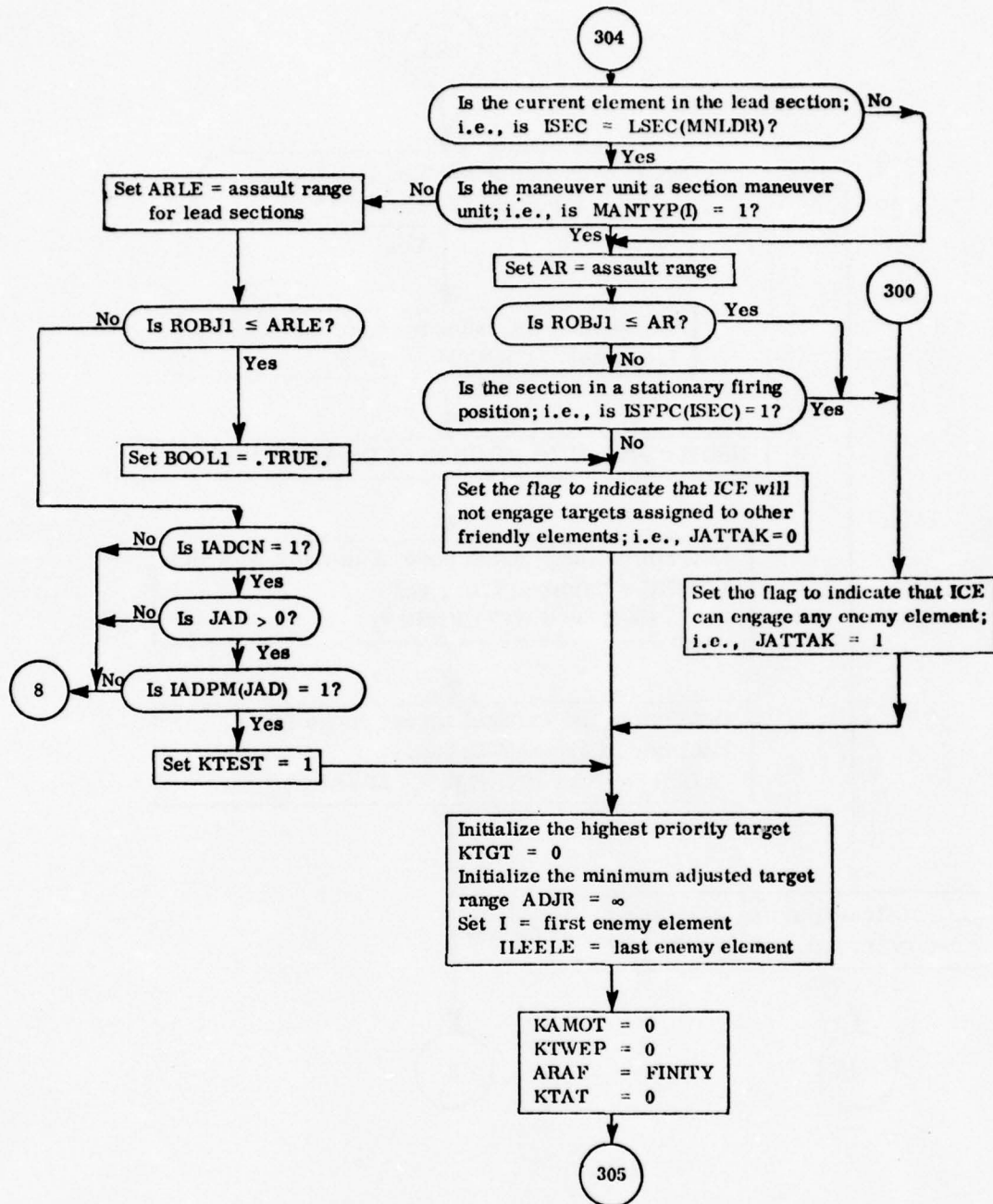
Subroutine FIRCON: Continued



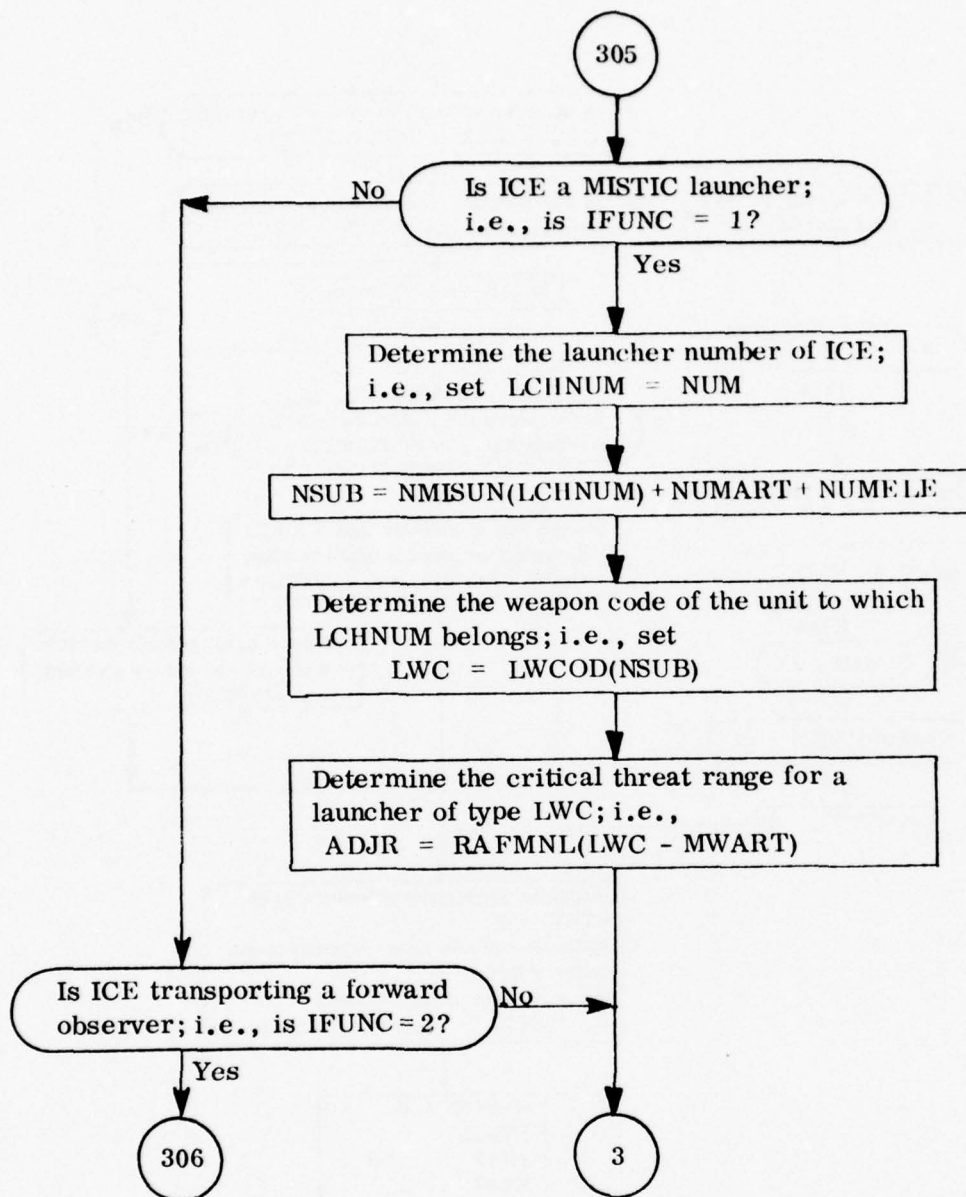
Subroutine FIRCON: Continued



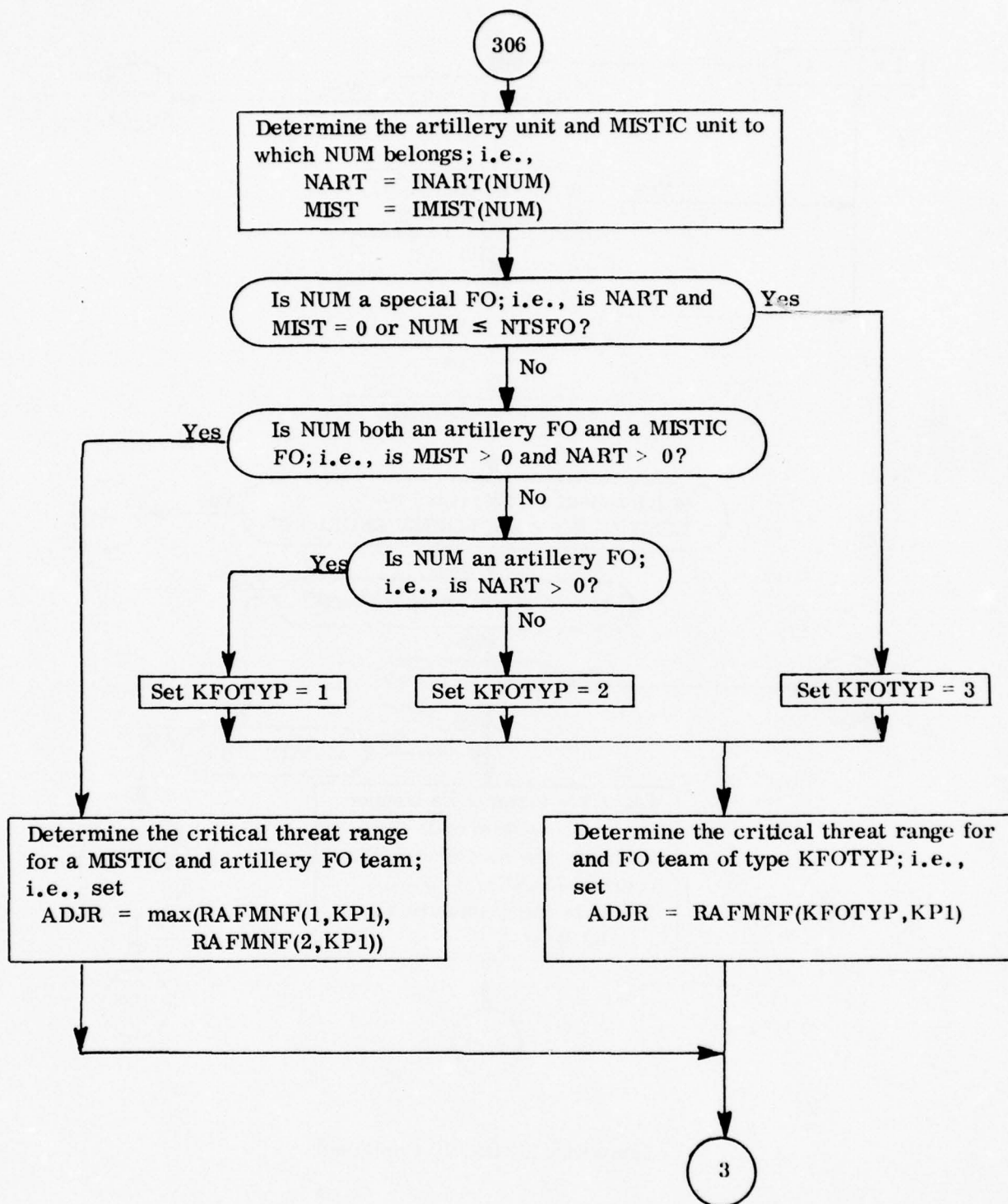
Subroutine FIRCON: Continued



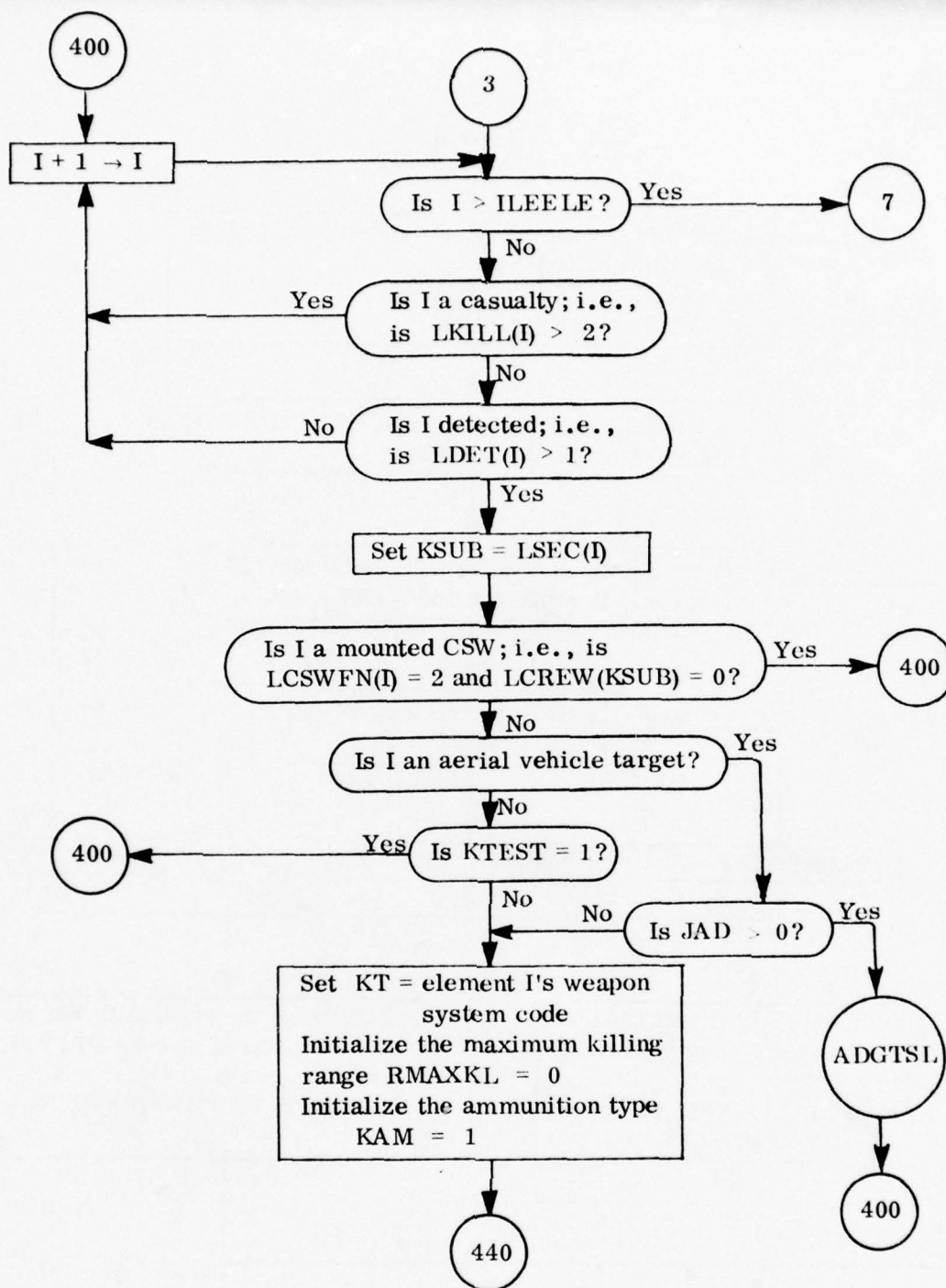
Subroutine FIRCON: Continued



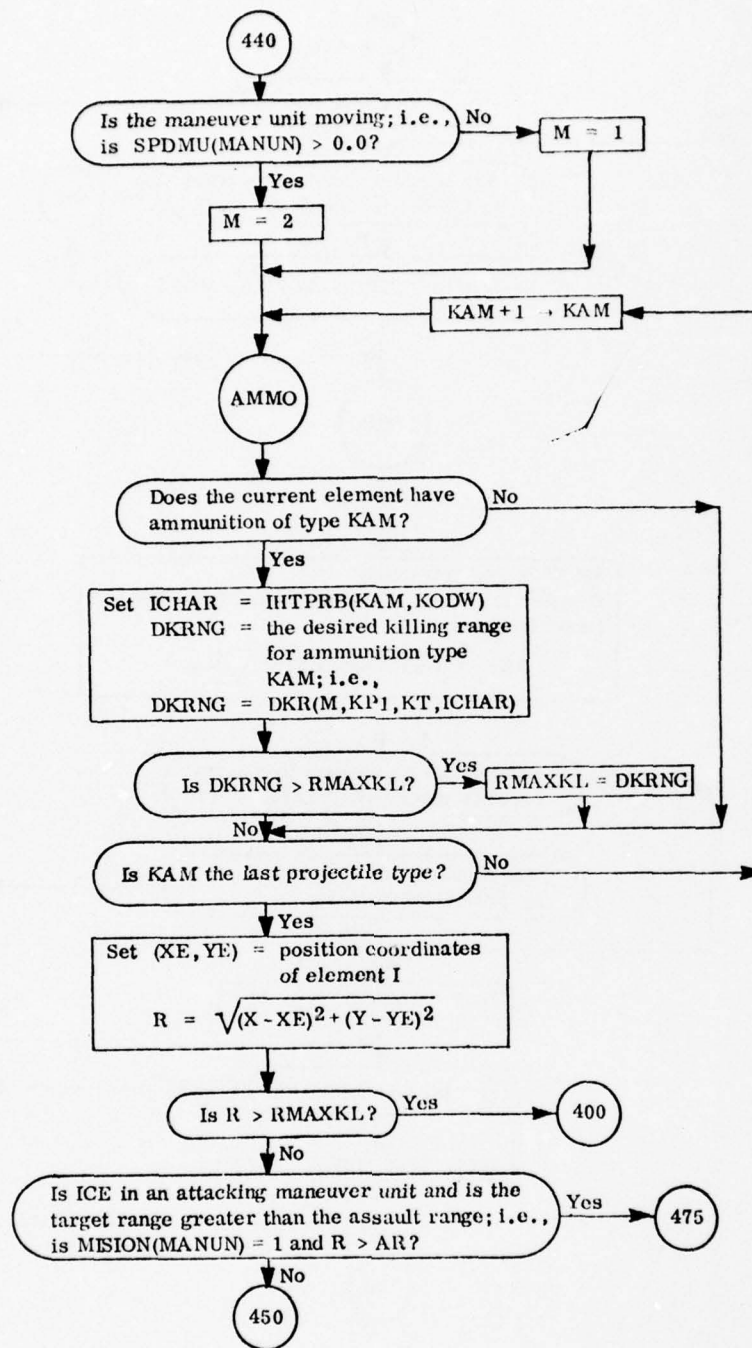
Subroutine FIRCON: Continued



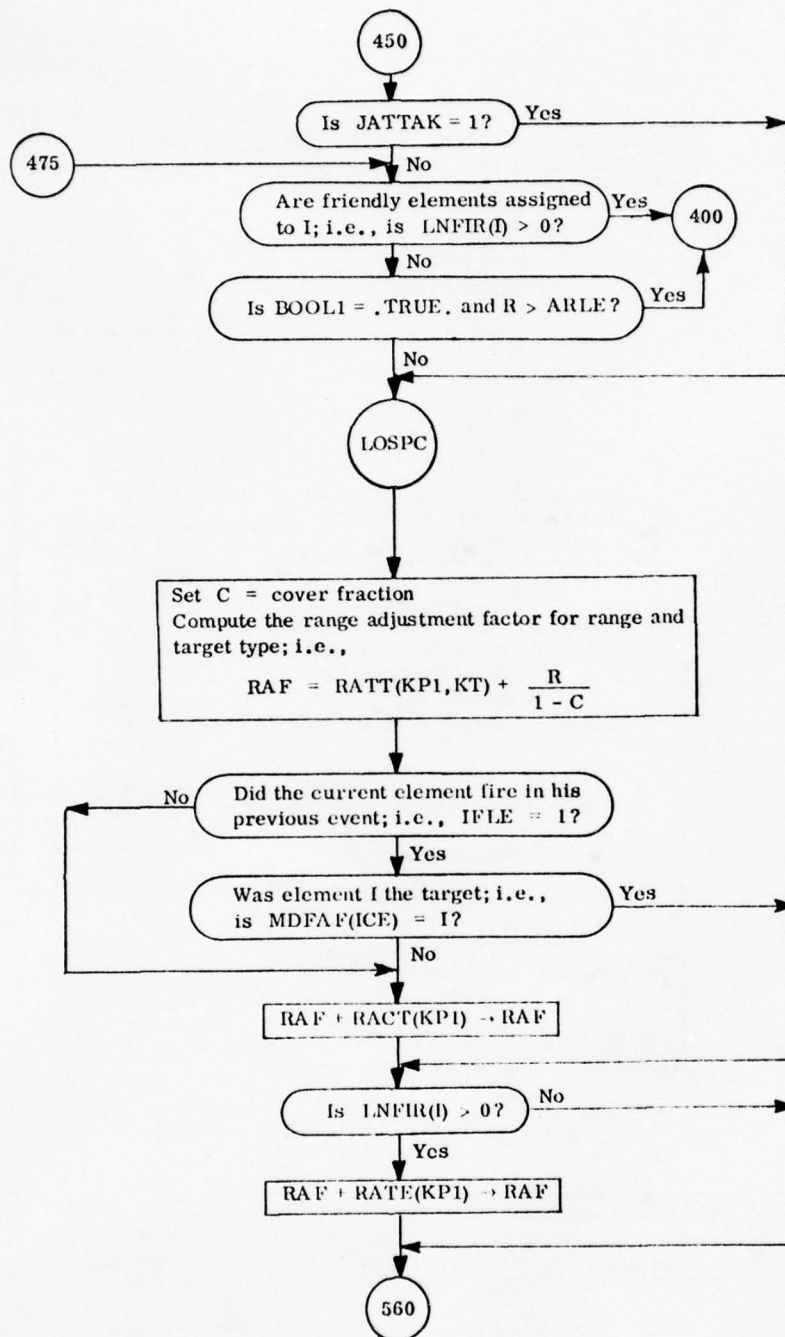
Subroutine FIRCON: Continued



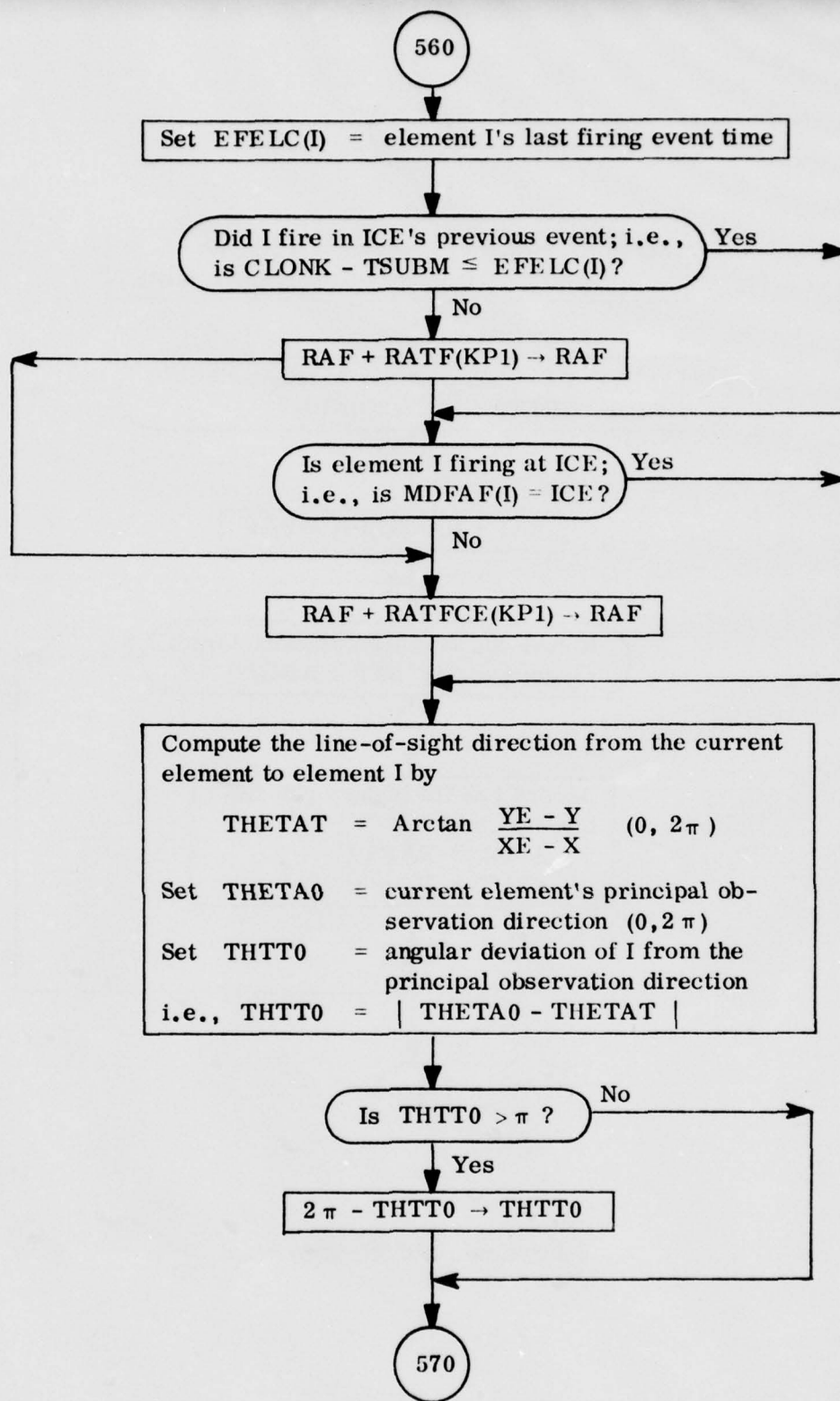
Subroutine FIRCON: Continued



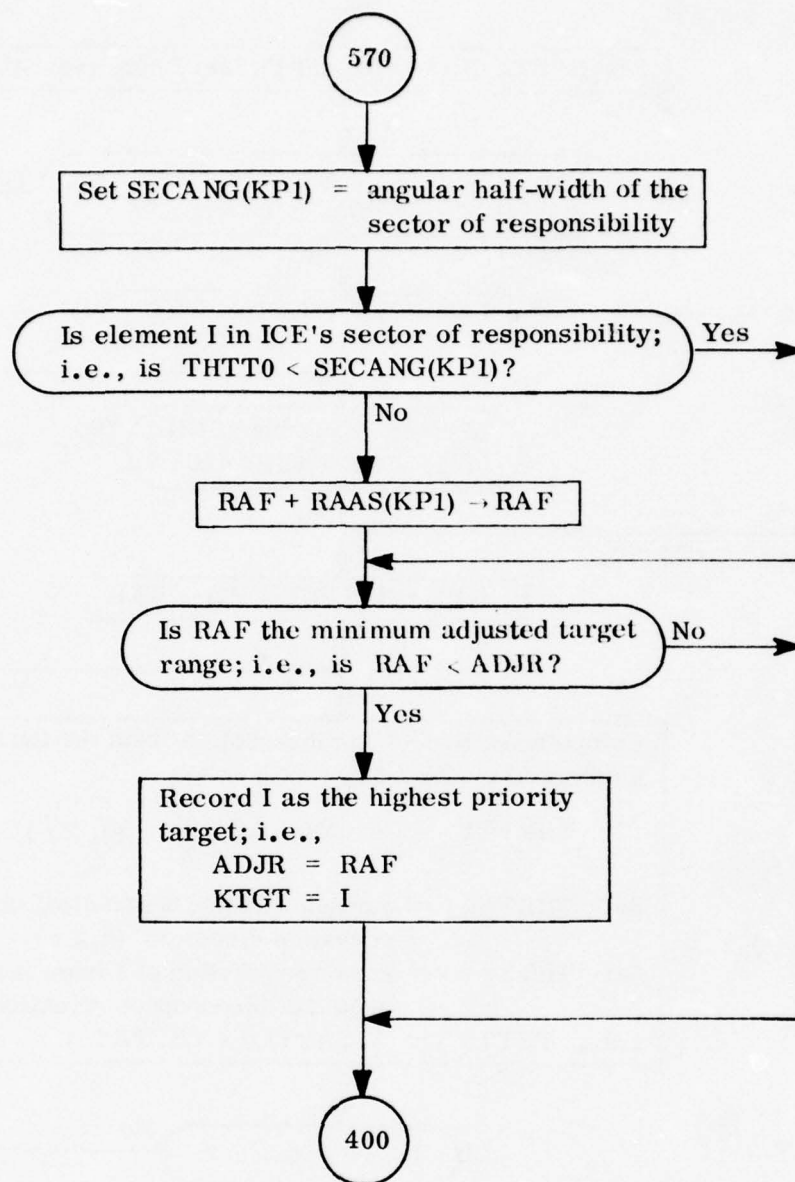
Subroutine FIRCON: Continued



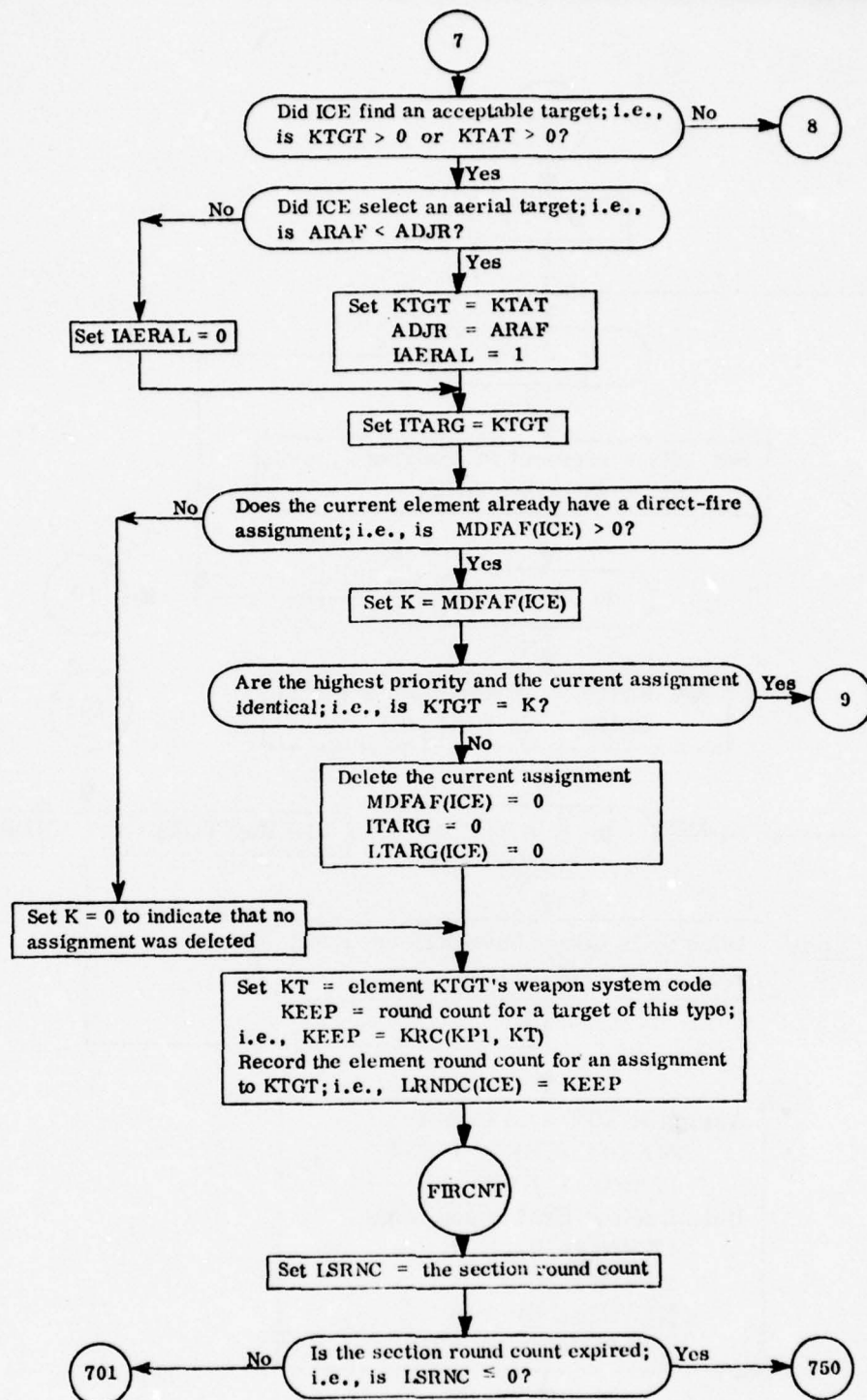
Subroutine FIRCON: Continued



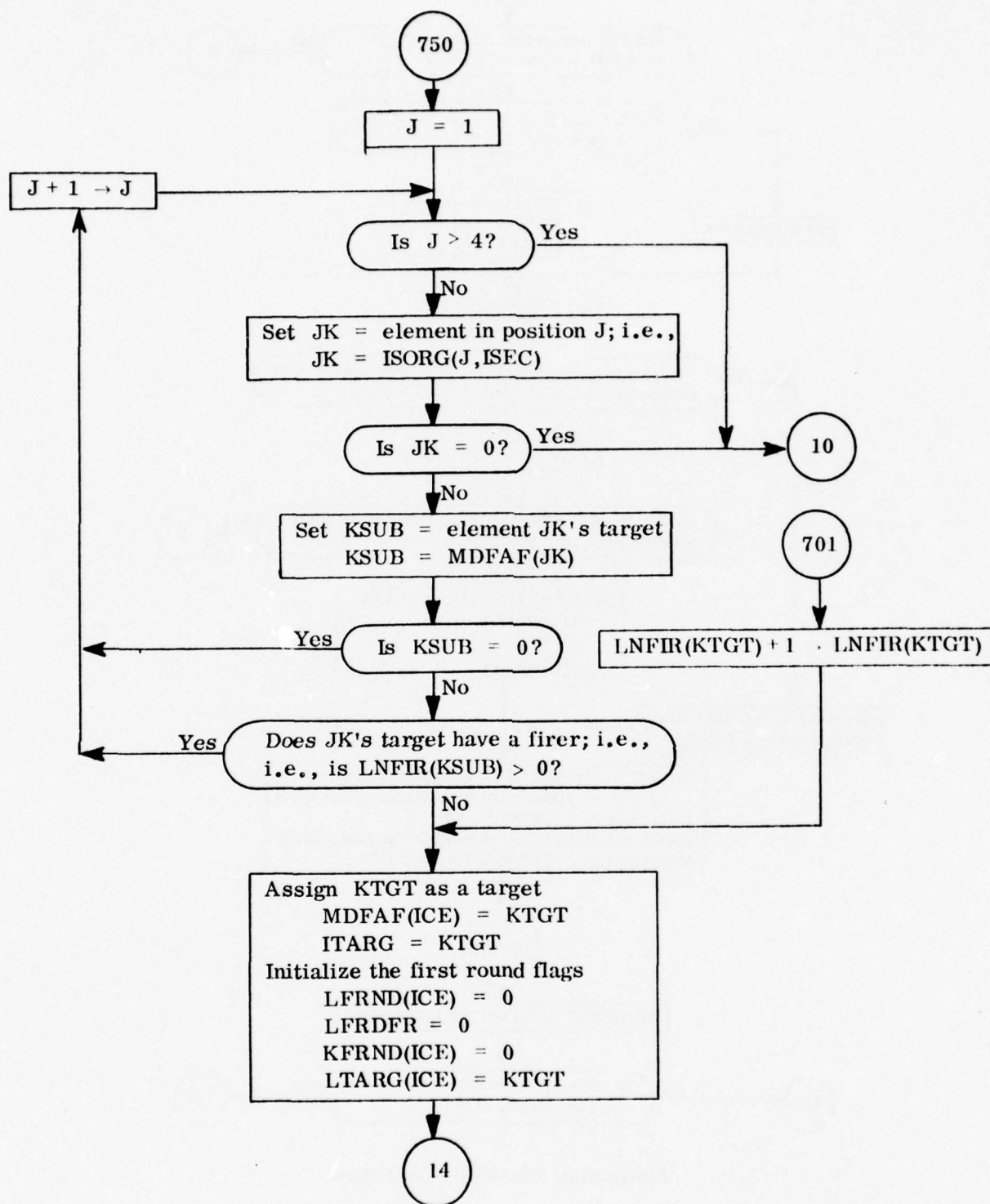
Subroutine FIRCON: Continued



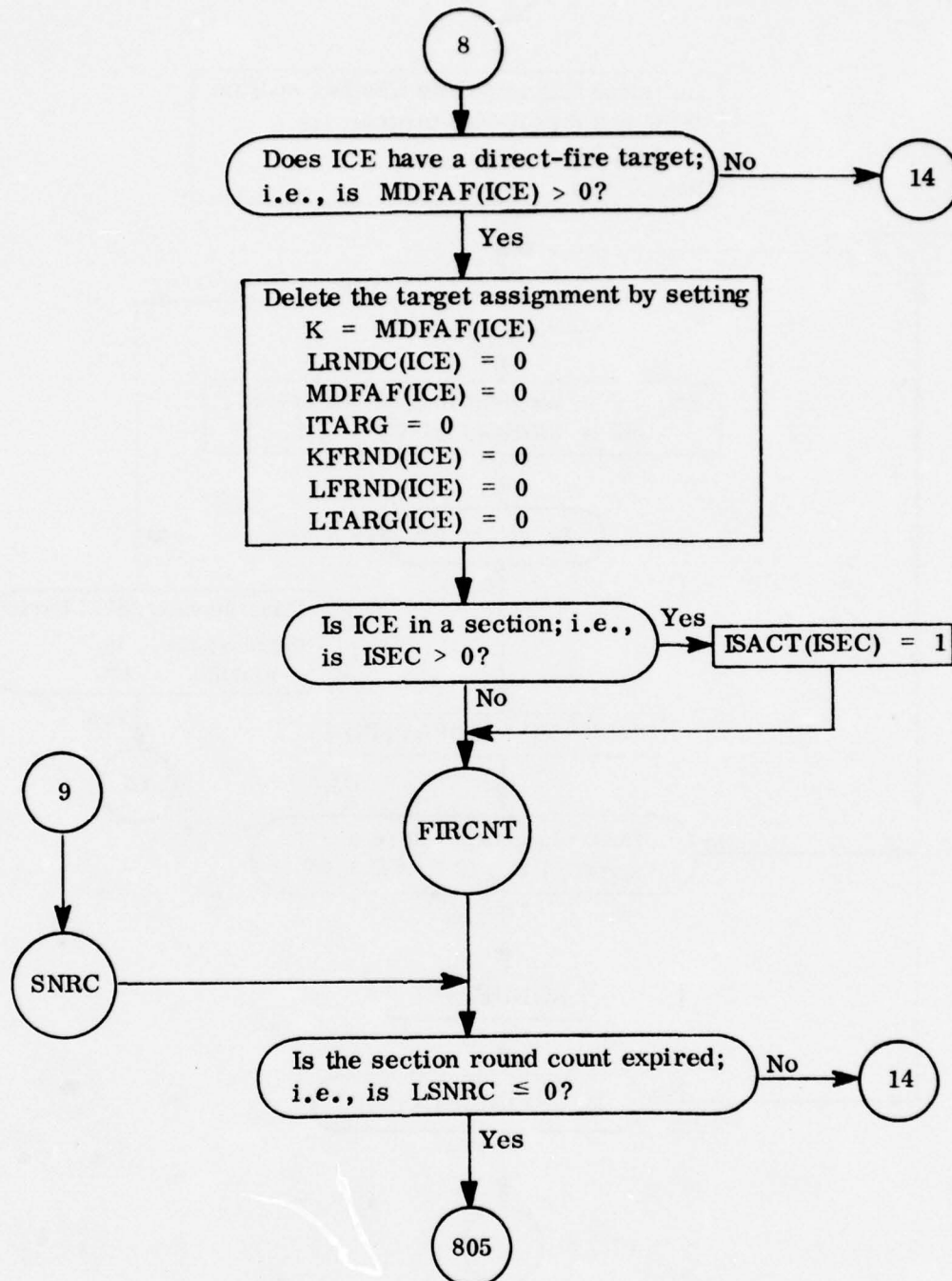
Subroutine FIRCON: Continued



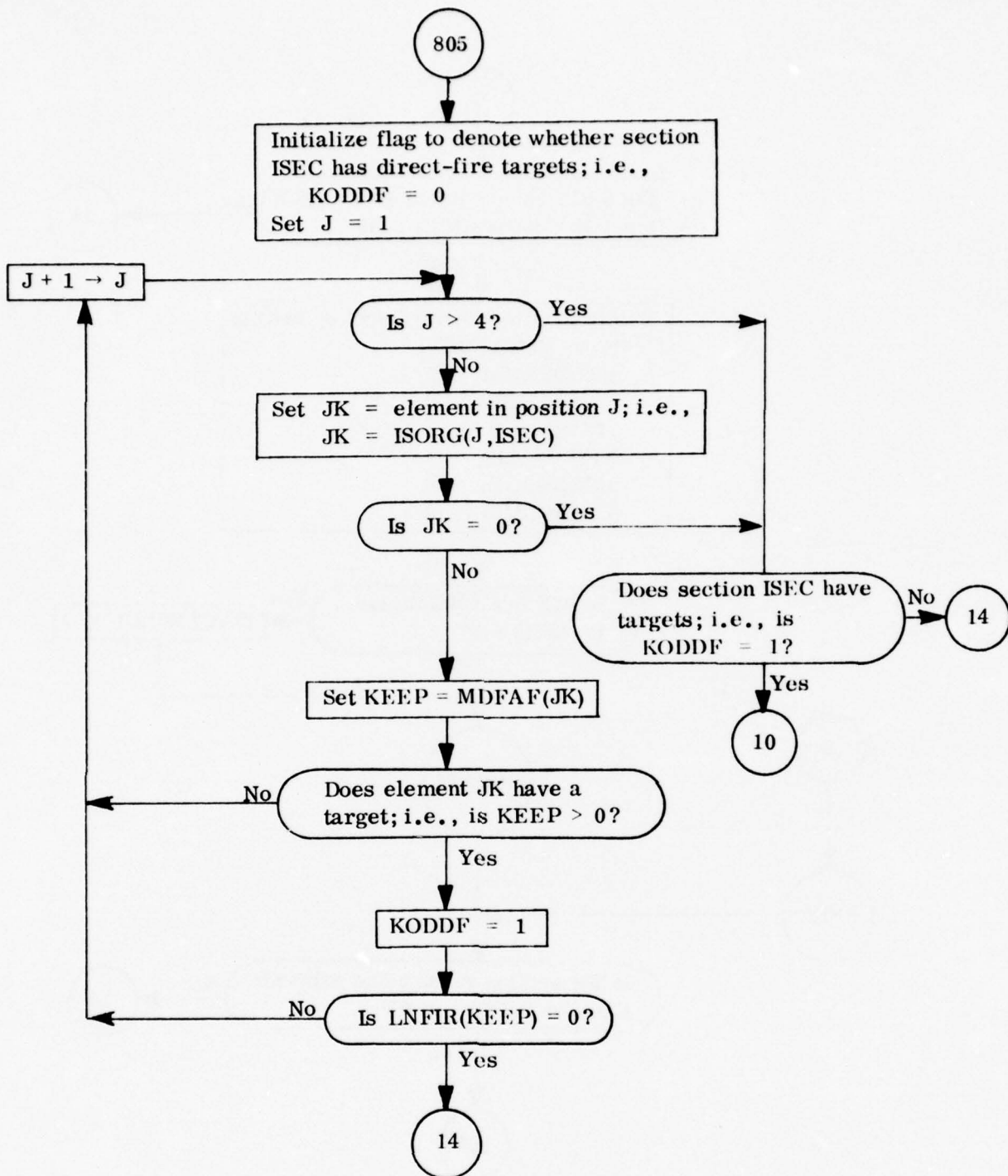
Subroutine FIRCON: Continued



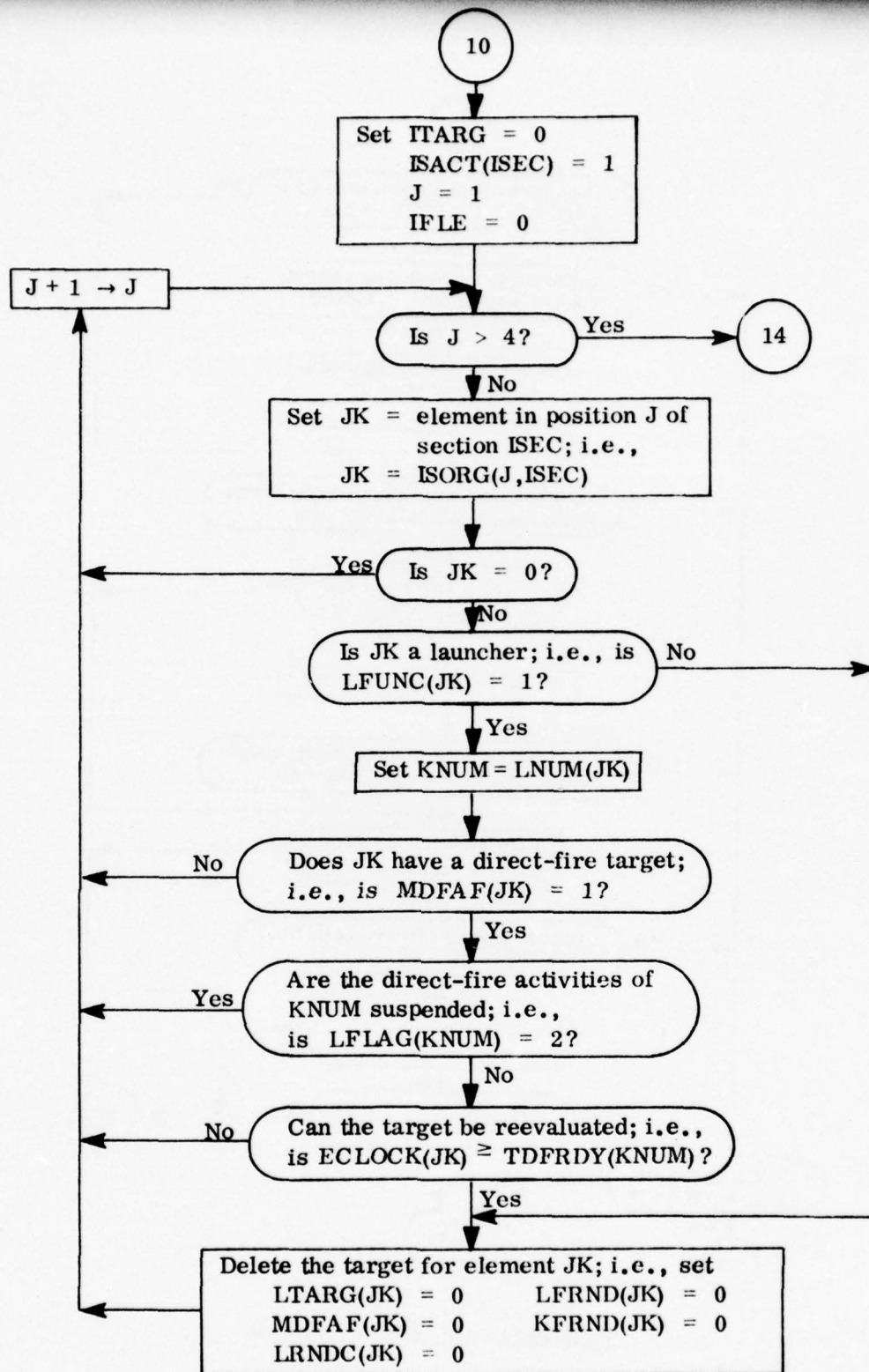
Subroutine FIRCON: Continued



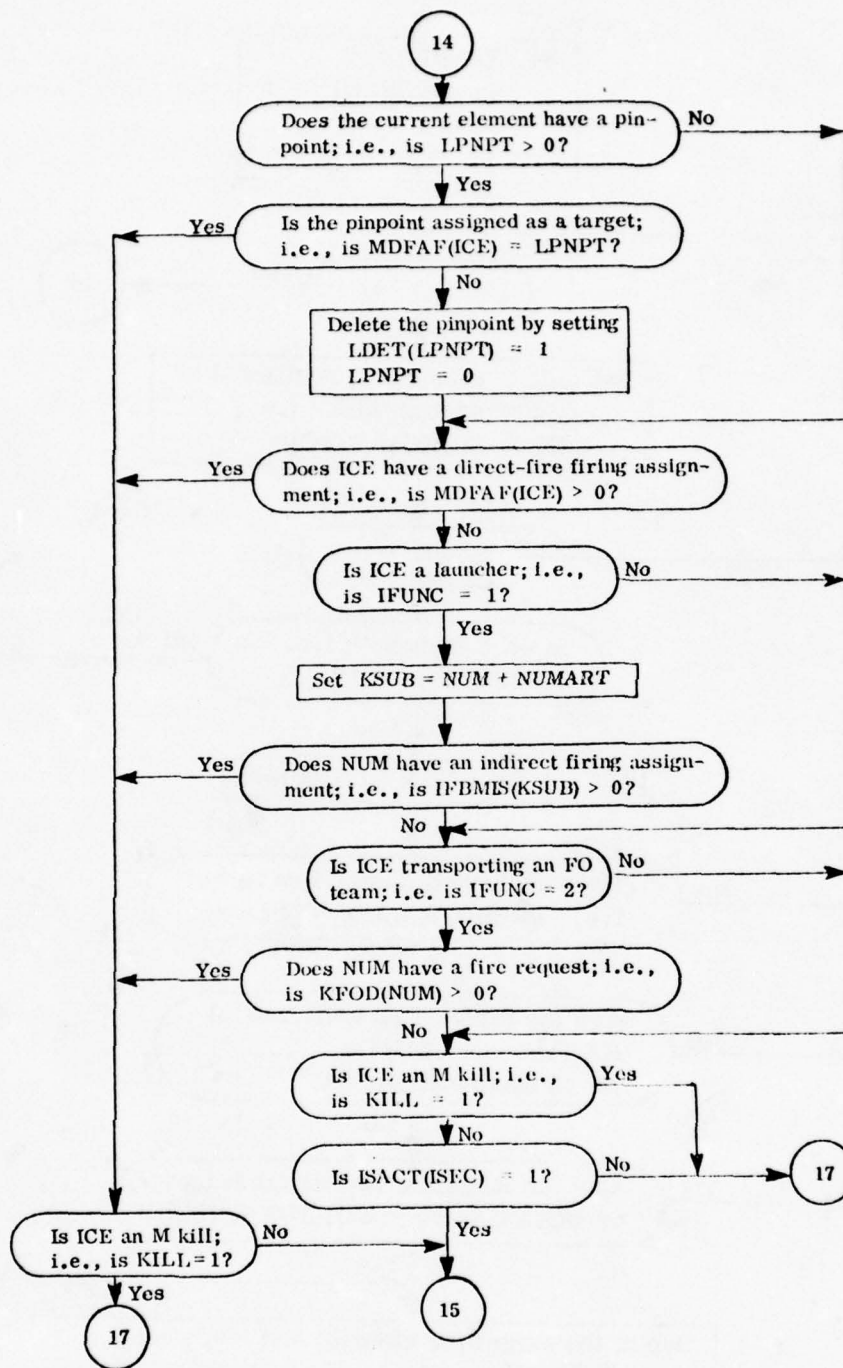
Subroutine FIRCON: Continued



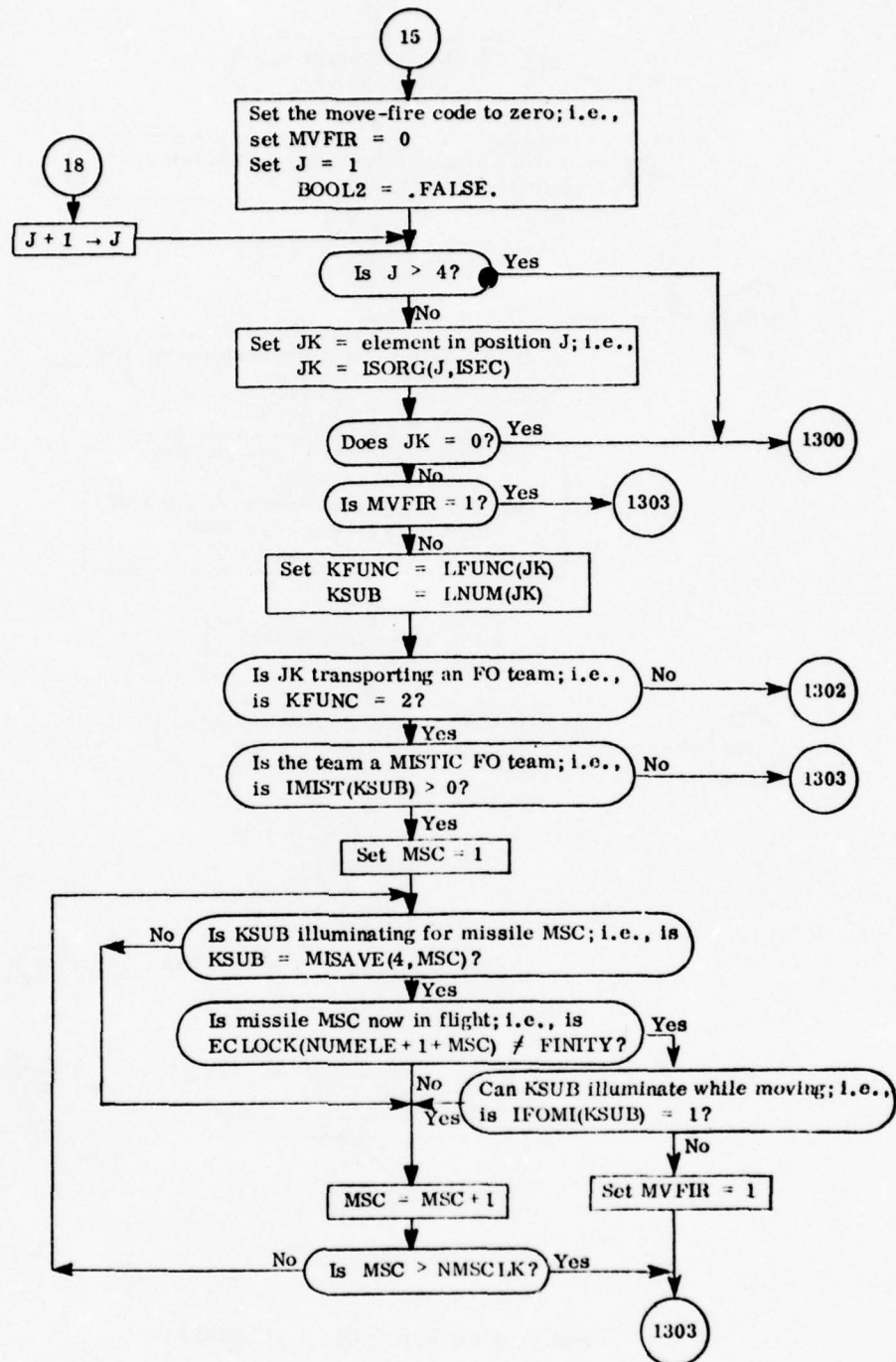
Subroutine FIRCON: Continued



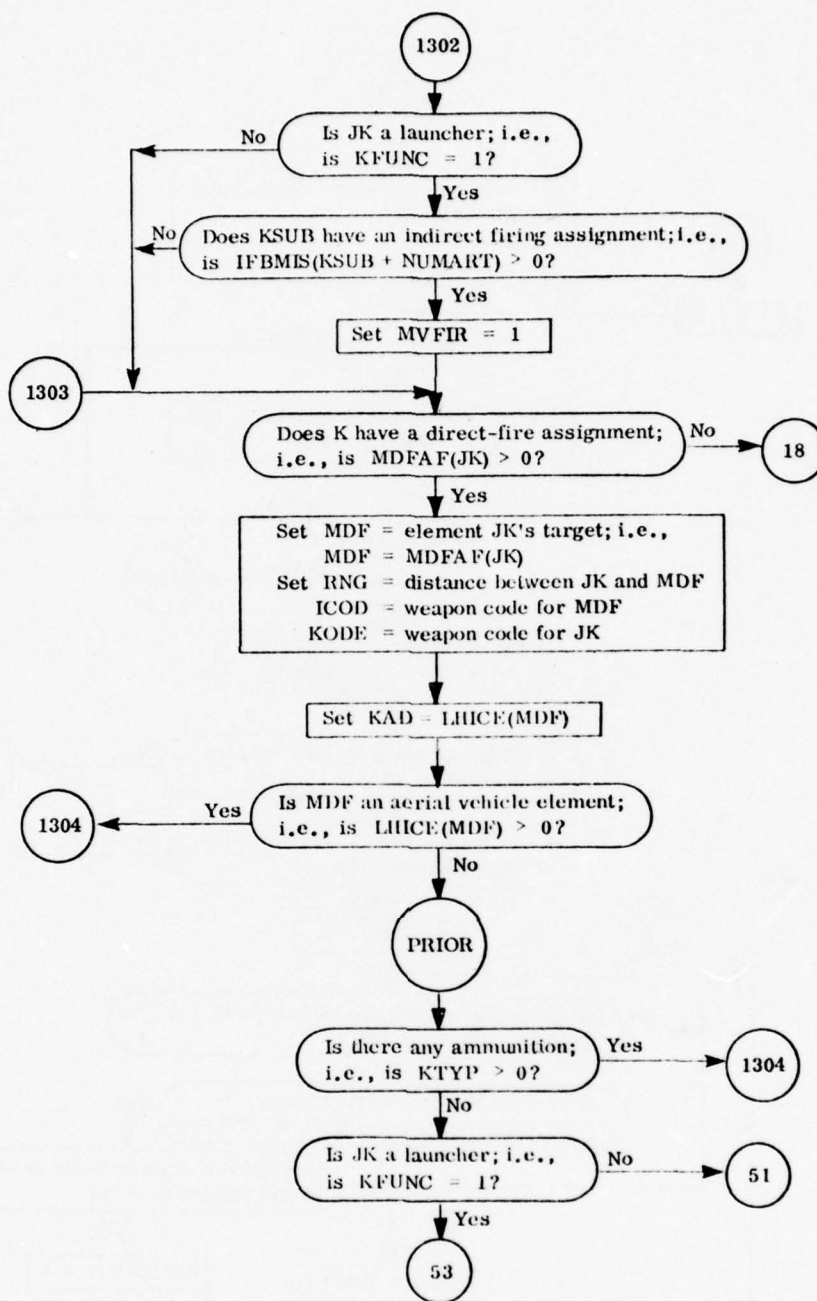
Subroutine FIRCON: Continued



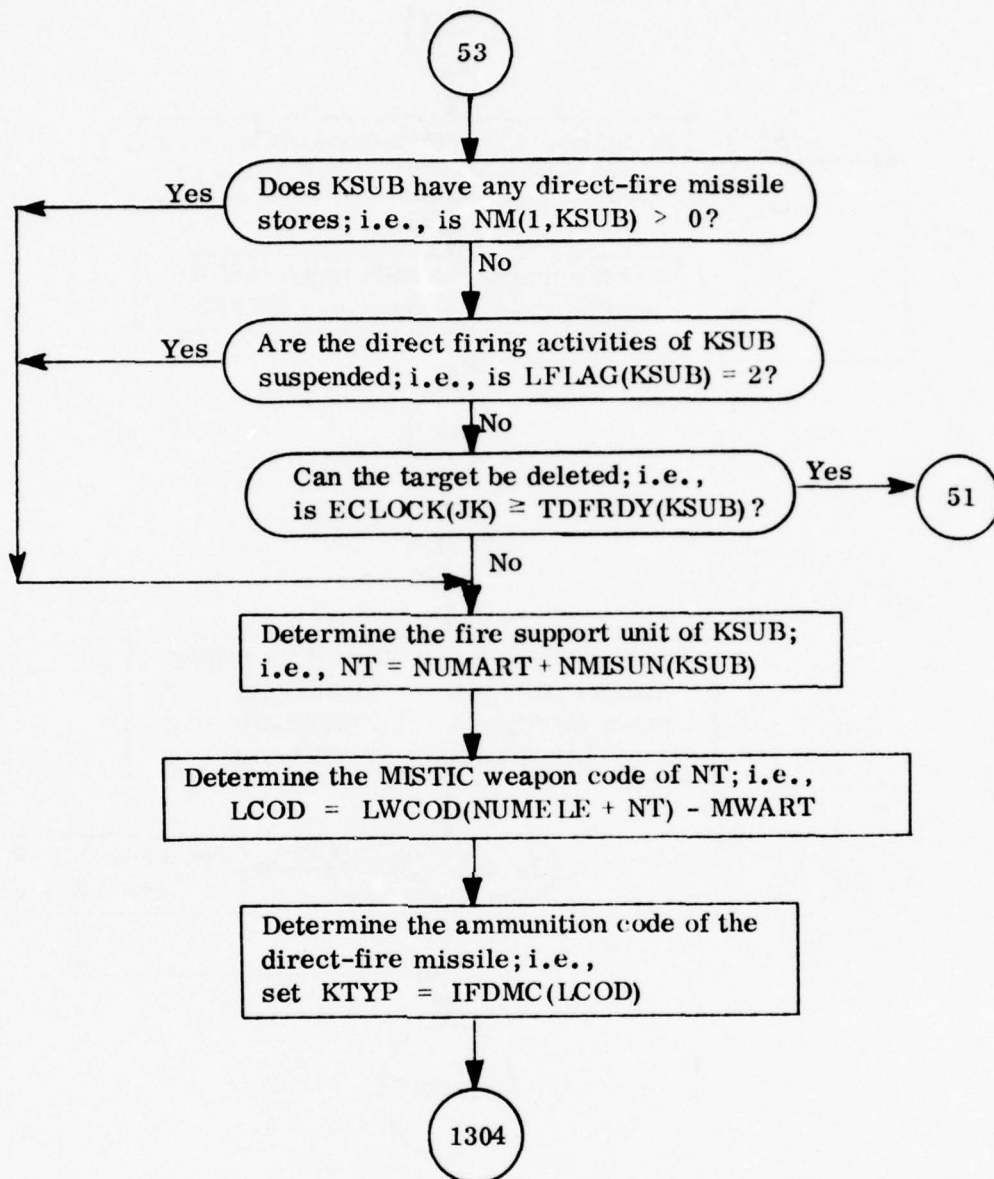
Subroutine FIRCON: Continued



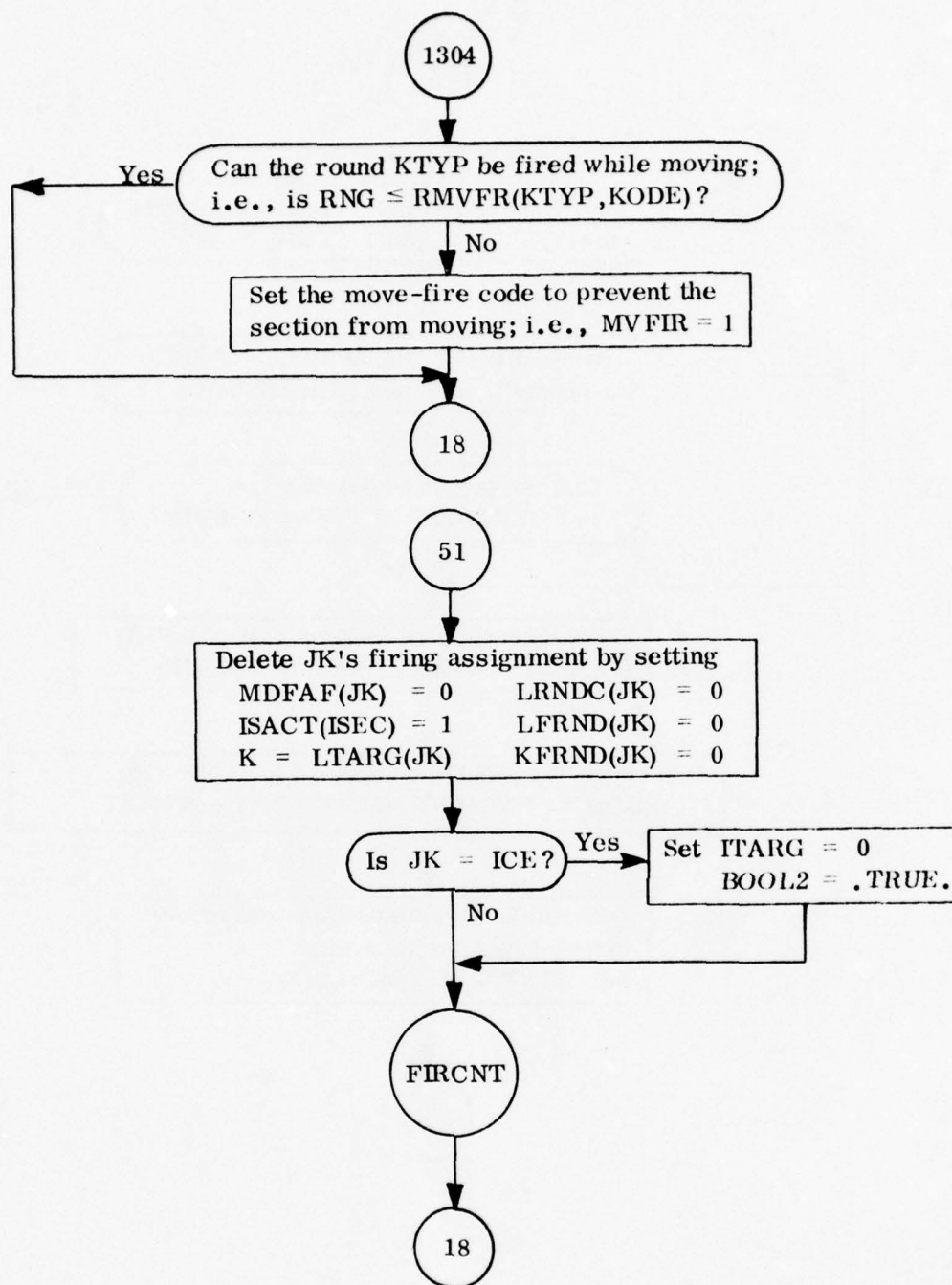
Subroutine FIRCON: Continued



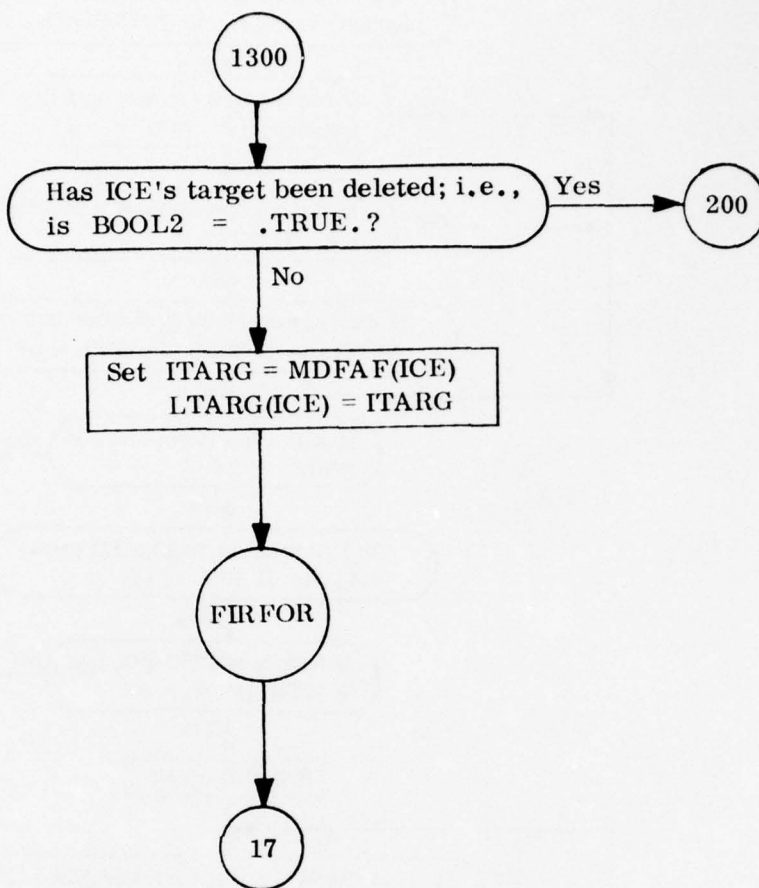
Subroutine FIRCON: Continued



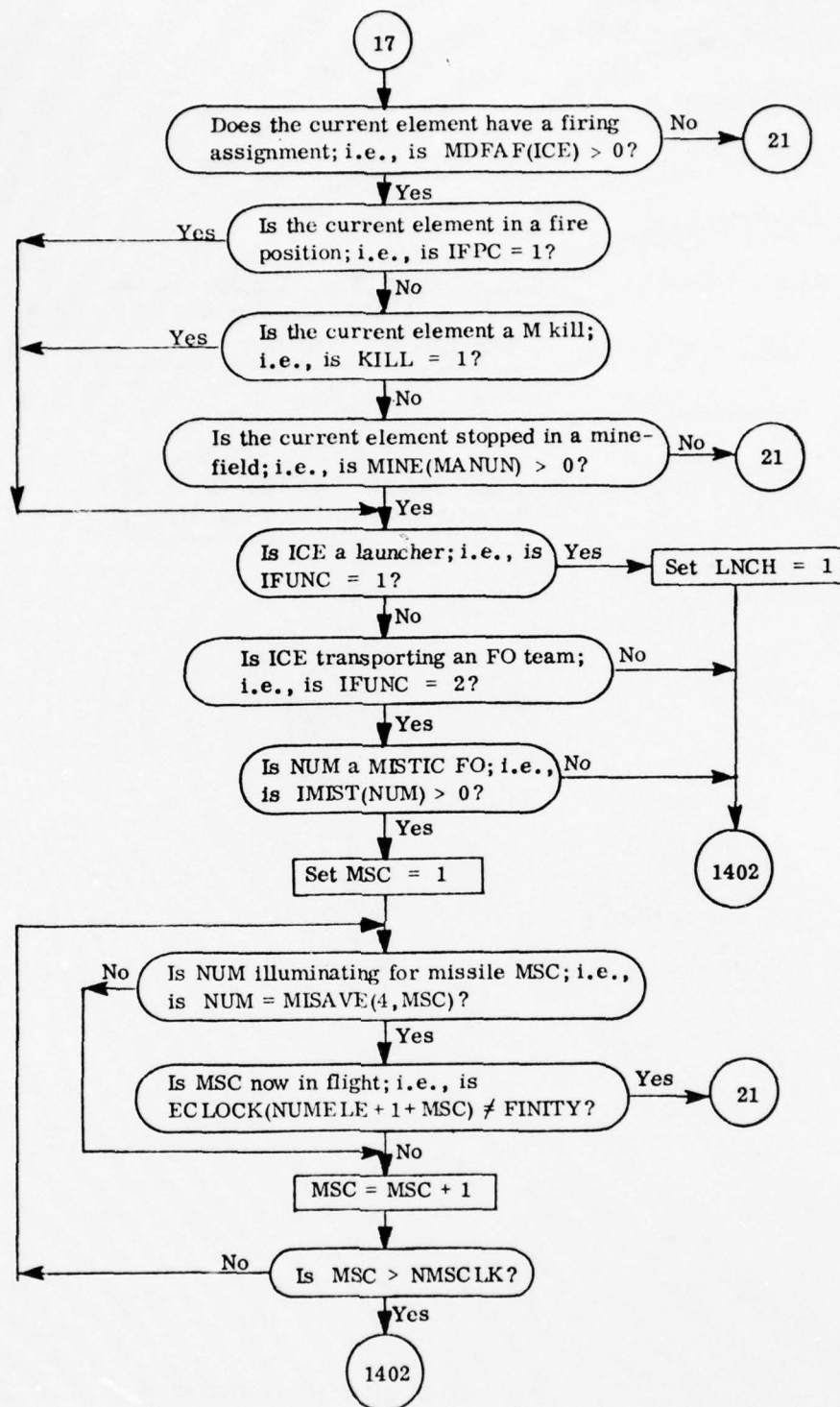
Subroutine FIRCON: Continued



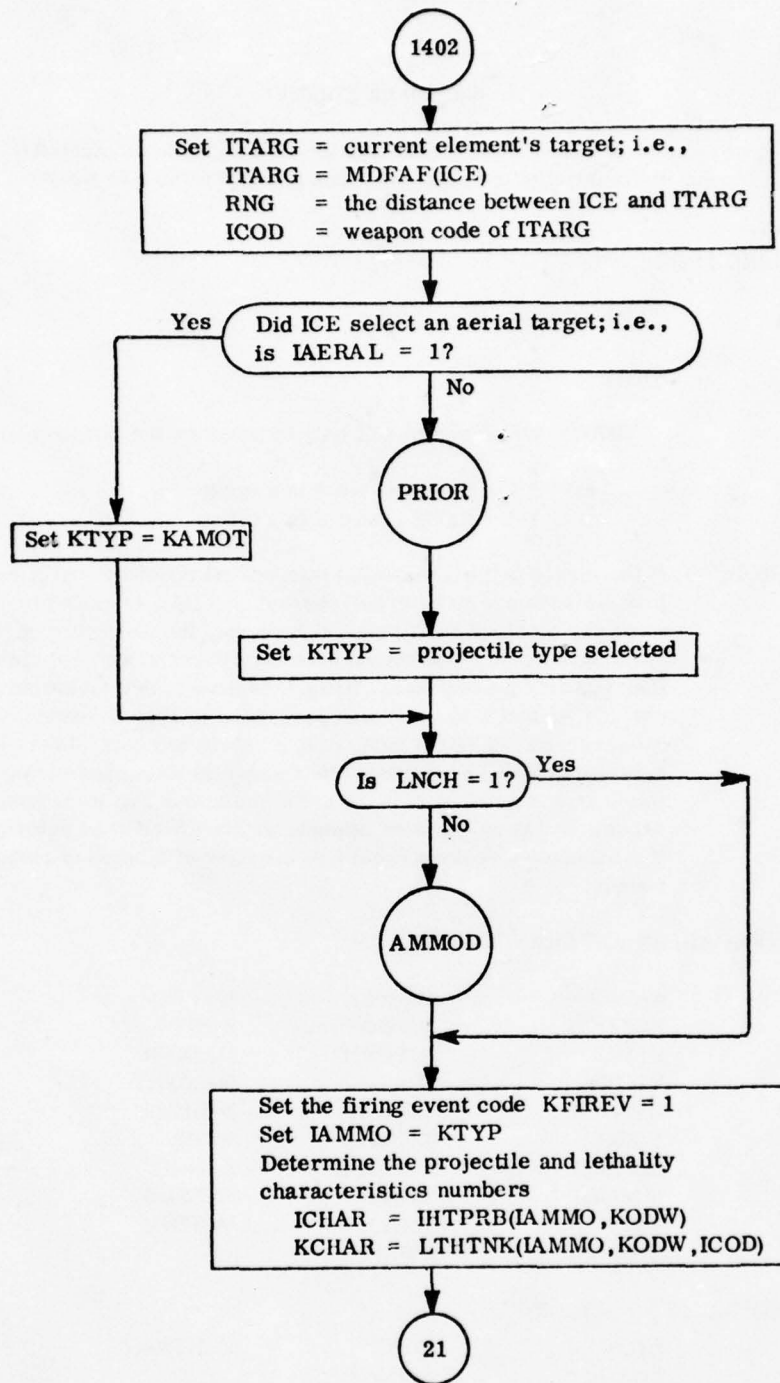
Subroutine FIRCON: Continued



Subroutine FIRCON: Continued



Subroutine FIRCON: Continued



Subroutine FIRCON: Continued

Subroutine FIRMOD

PURPOSE: Subroutine FIRMOD executes the firing and determines the lethality effects of all main tank gun and rapid fire weapon firing events.

CALLING SEQUENCE:

CALL FIRMOD(KILL, IHIT)

where

KILL = the returned kill type inflicted on the target weapon

$$IHIT = \begin{cases} 0 & \text{- firing resulted in a miss} \\ 1 & \text{- firing resulted in a hit.} \end{cases}$$

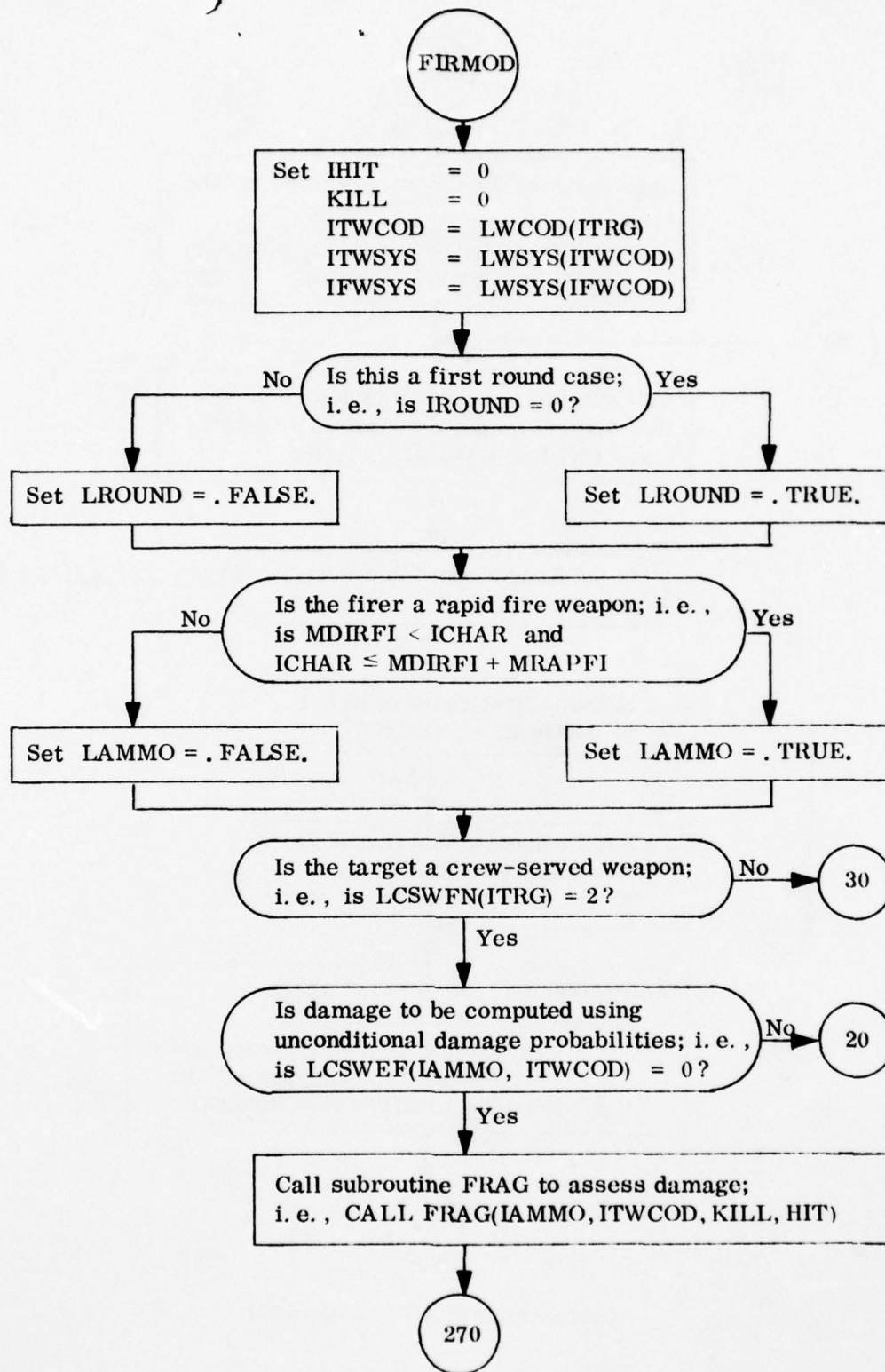
METHOD: If the target is a crew-served weapon and unconditional damage probabilities are to be used, subroutine FRAG is called to determine the result of the firing. Otherwise, the crew-served weapon is assigned a dummy weapon code for assessment. For a main tank gun firing, subroutine HPROB is used to determine the hit probability and a Monte Carlo procedure is used to decide if a hit occurred. If no hit occurred, a return is made, otherwise subroutine TLETH assesses the damage to the target element. Rapid fire is handled similar to the main tank gun logic with the exception that no decision is made within FIRMOD to determine if a hit occurred since rapid fire consists of a burst of independent rounds.

COMMON AREAS REFERENCED:

| | | |
|--------|---------|--------|
| AMMOCH | ICSWEL | LWCOD |
| ECLOCK | ICSWGPF | LWSYS |
| ELOCX | IHTPRB | MAINPR |
| ELOCY | IPAPUP | MAXWEP |
| ESPD | LCREW | NUMBER |
| FIRKON | LCSWEP | PKPB |
| HITPRB | LCSWPN | RANGE |
| IAMMO | LDRGH | SATARG |
| IANYPT | LKILL | TGTDIM |
| ICECOM | LPHIT | |

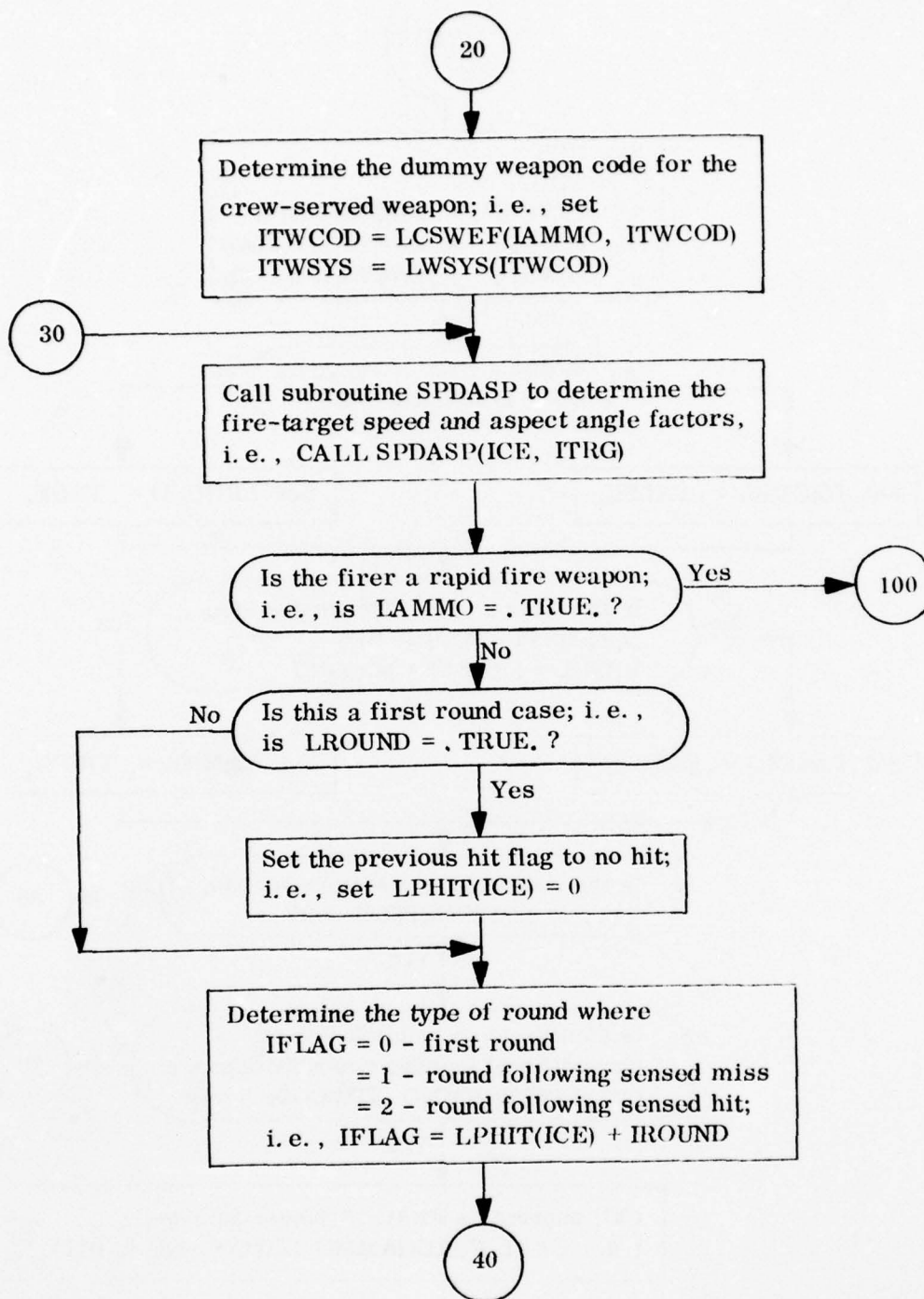
SUBROUTINES REQUIRED:

| | | |
|-------|--------|-------|
| ELOC | RGXY | TLETH |
| FRAG | SPDASP | |
| HPROB | SUMOUT | |

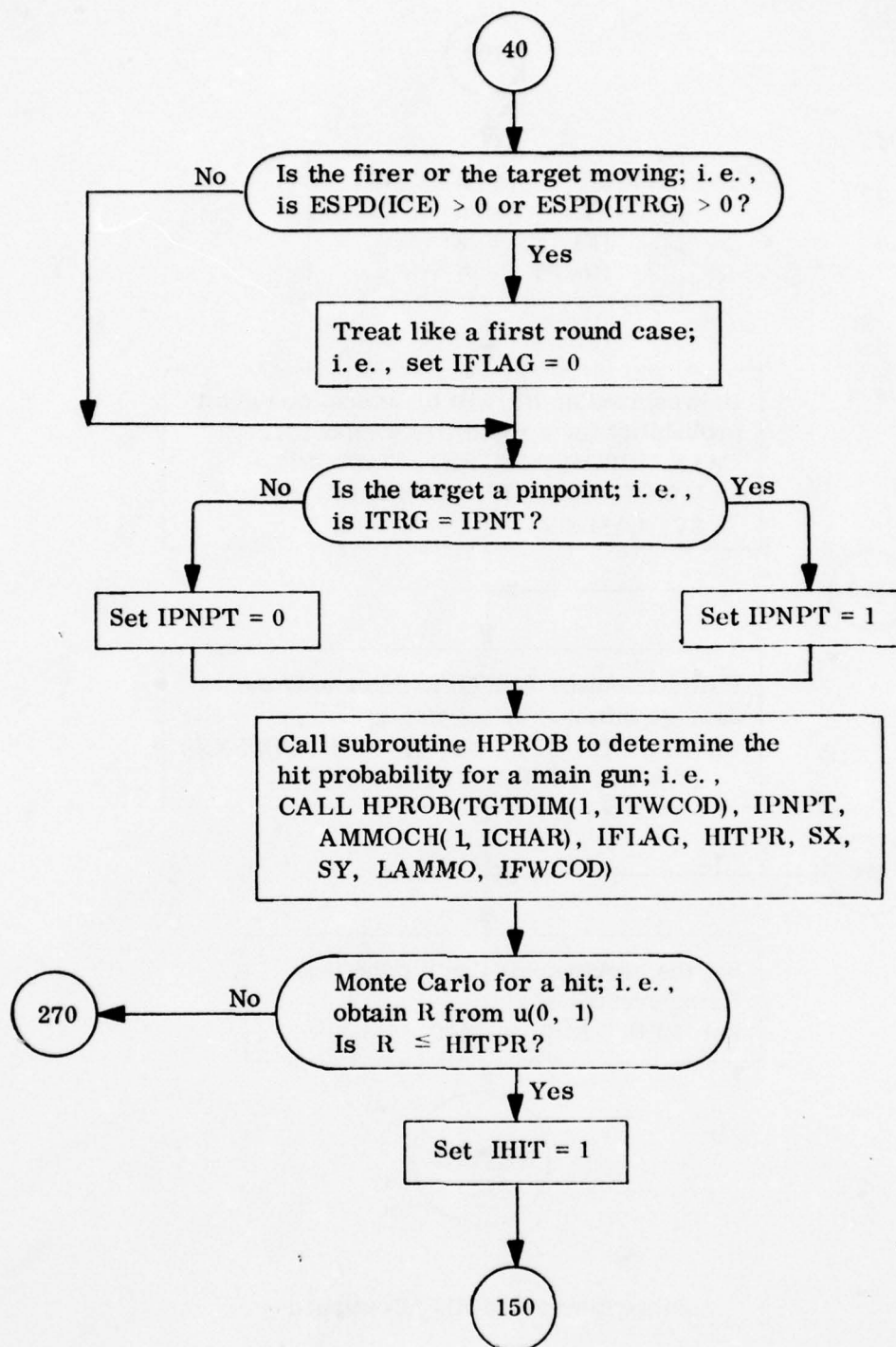


Subroutine FIRMOD: Firing Model

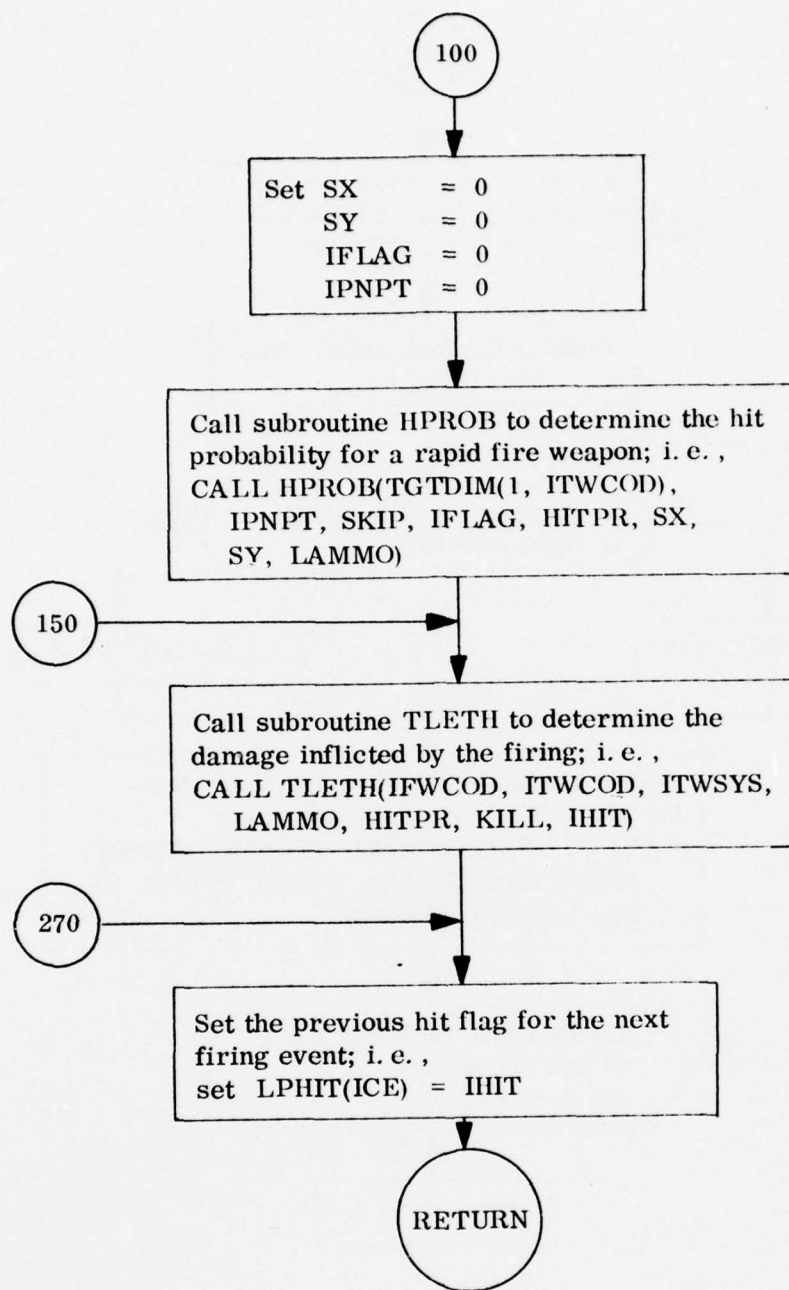
B-333



Subroutine FIRMOD: Continued



Subroutine FIRMOD: Continued



Subroutine FIRMOD: Continued

Subroutine FLGSET

PURPOSE: Subroutine FLGSET is designed to represent movement activity transitions that occur during the course of an aerial vehicle mission.

CALLING SEQUENCE:

CALL FLGSET(IRS)

where

IRS = indicator for the type of route to be selected during the current element's event (see subroutine PICKRT)

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| FORMSE | IUNACT | MANORG |
| ICECOM | JPHASE | MANTYP |
| IPHASE | JUNACT | MSFP |
| IPORG | LDPC | NAVSEC |
| ISFPC | LXSNRC | NVOLM |
| ISORG | | TMISUN |
| ITORG | | |

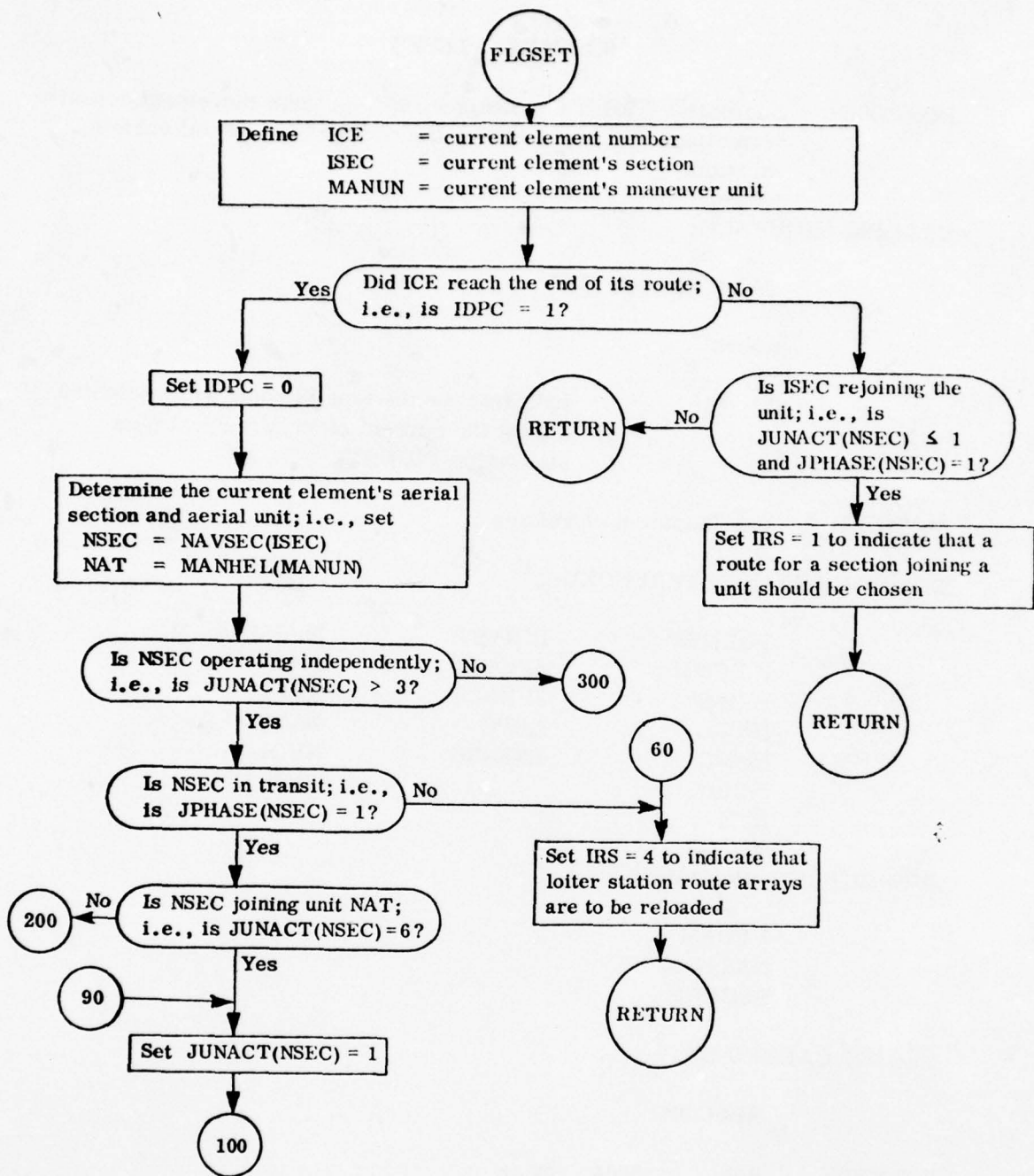
SUBROUTINES REQUIRED:

HFORM
NATLDR
SECPRM

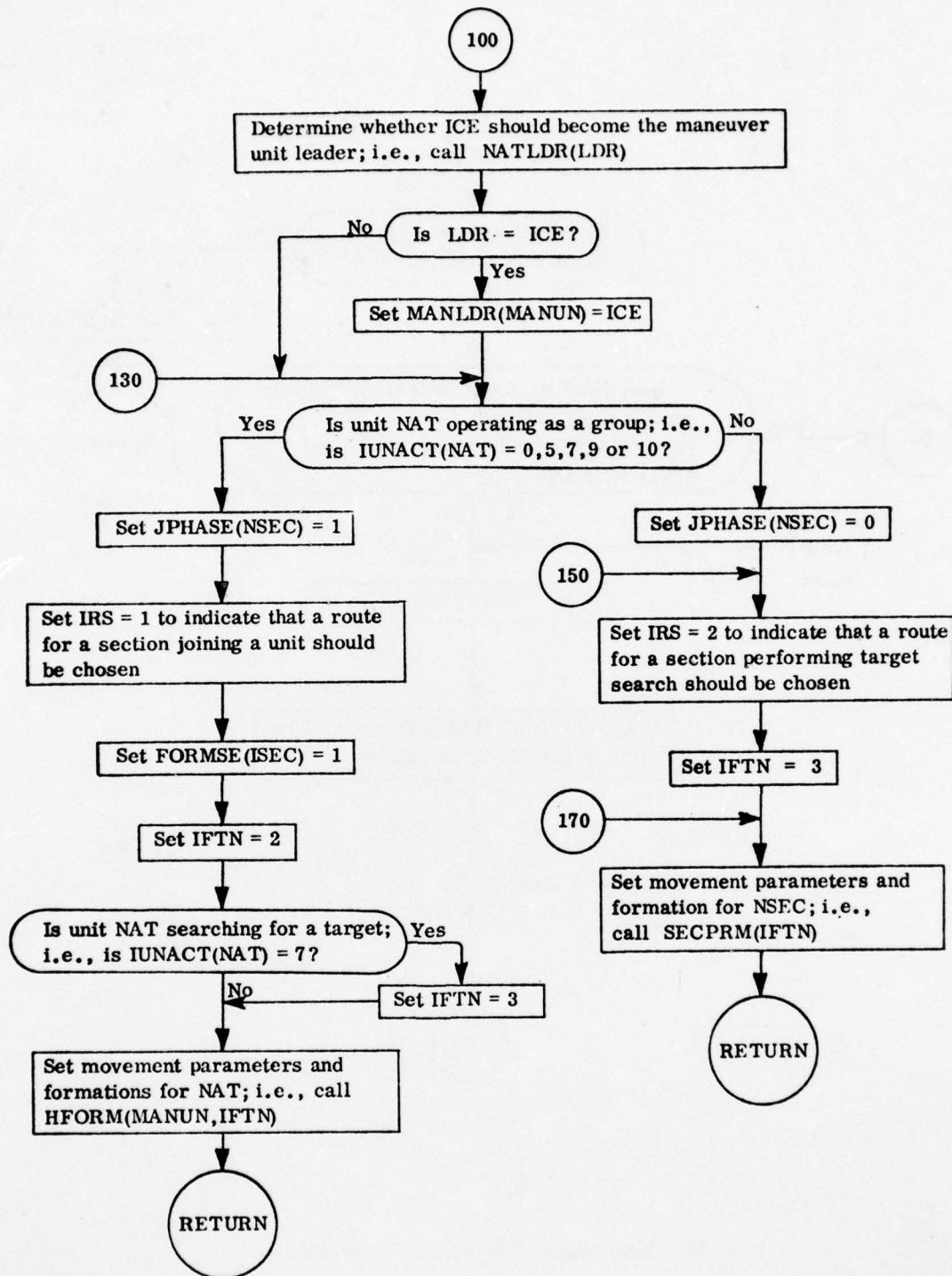
FLGSET CALLED BY:

HELCON

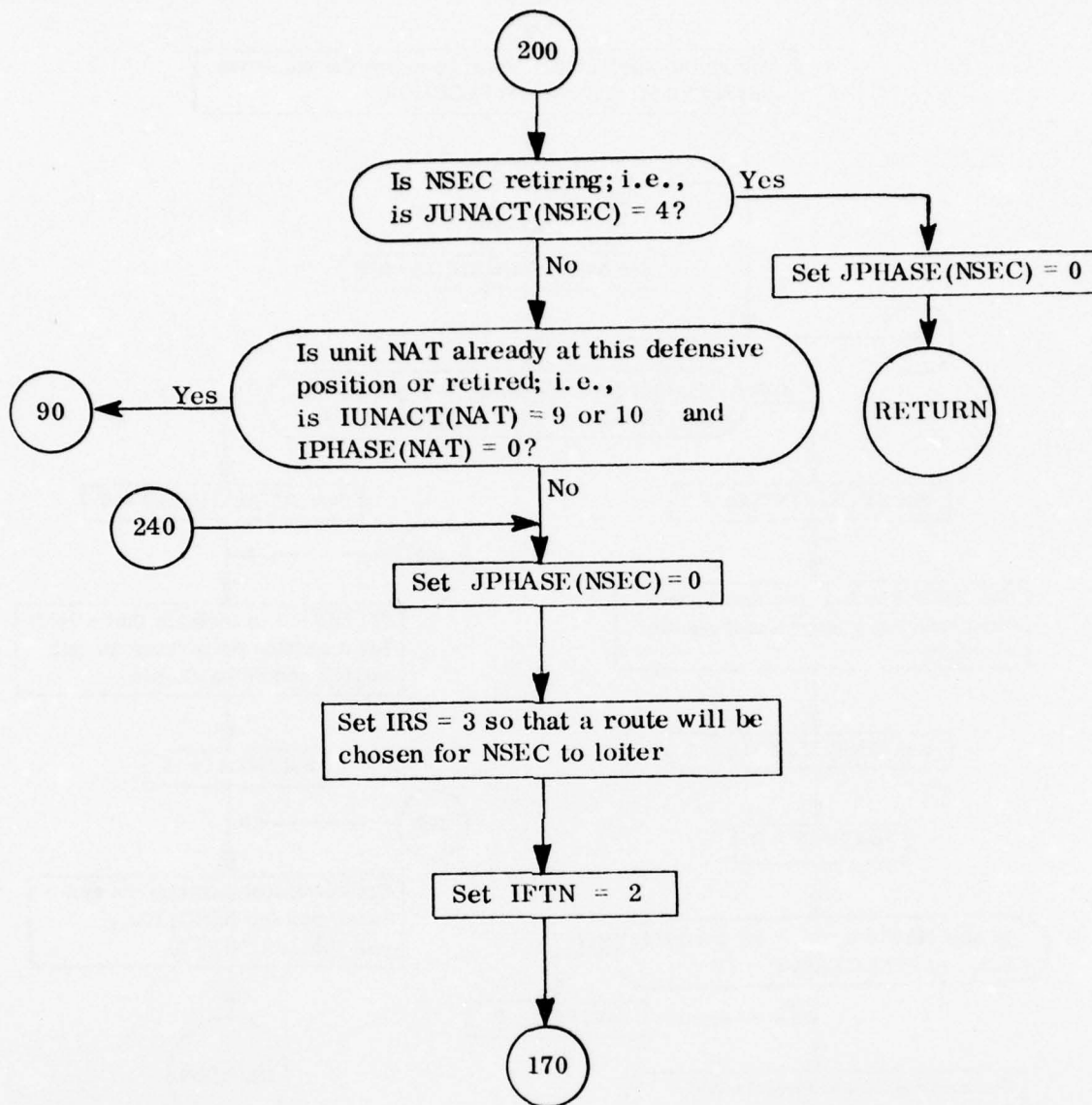
LENGTH: $BF8_{16} = 3064_{10}$ bytes



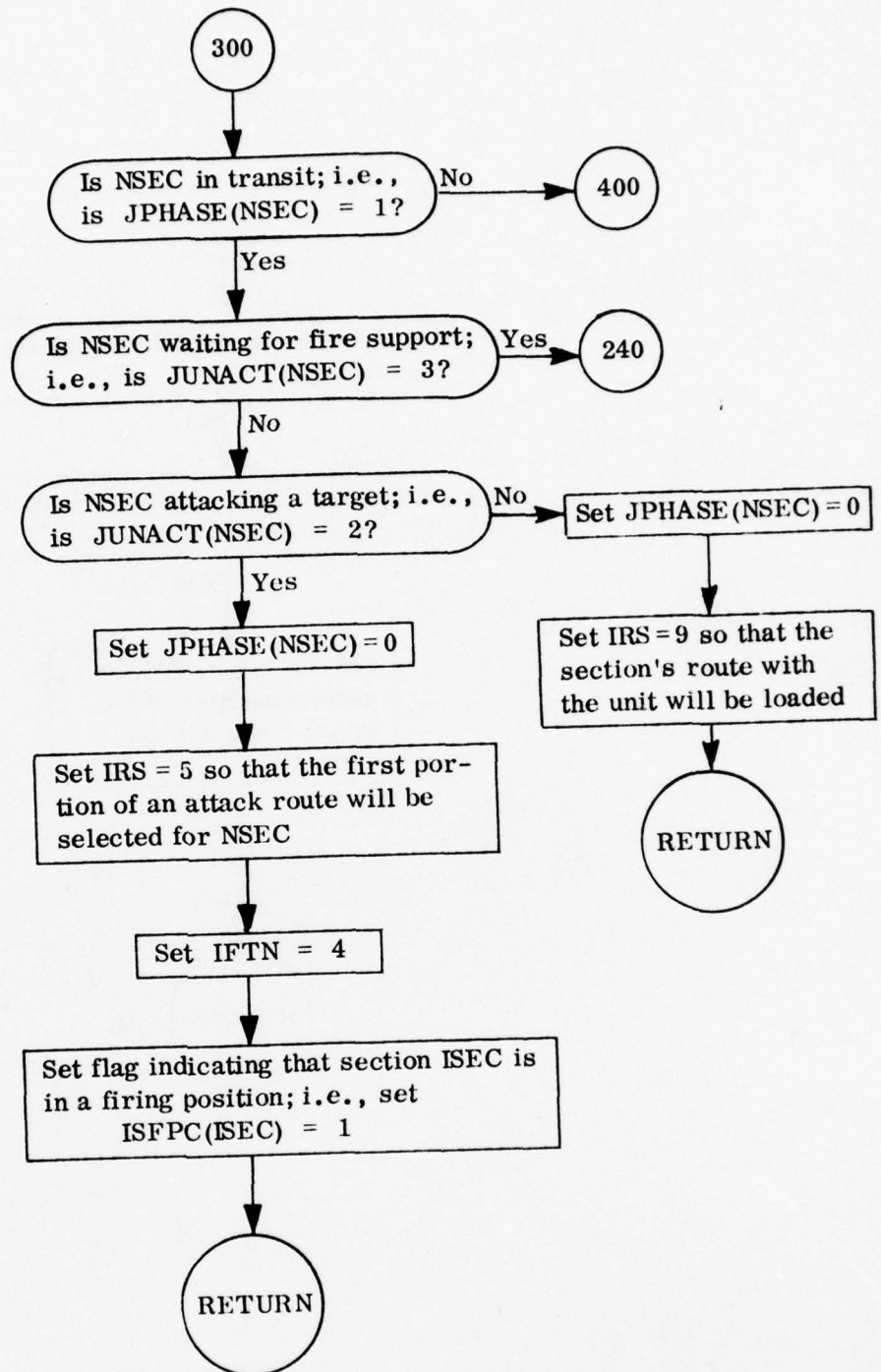
Subroutine FLGSET: Movement Decisions Arising from
Aerial Section Movement



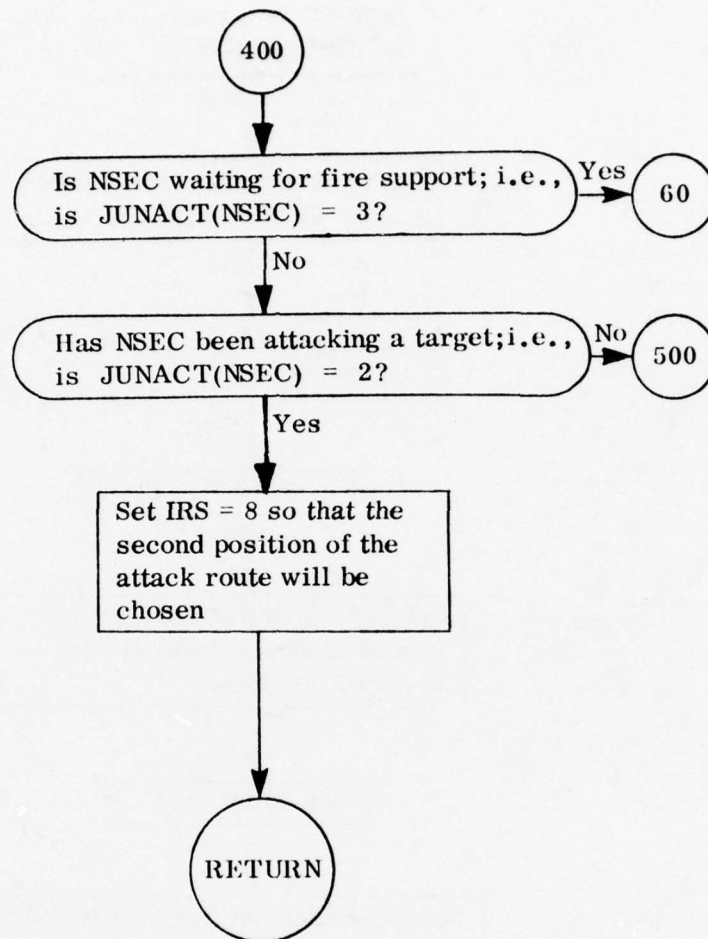
Subroutine FIGSET: Continued



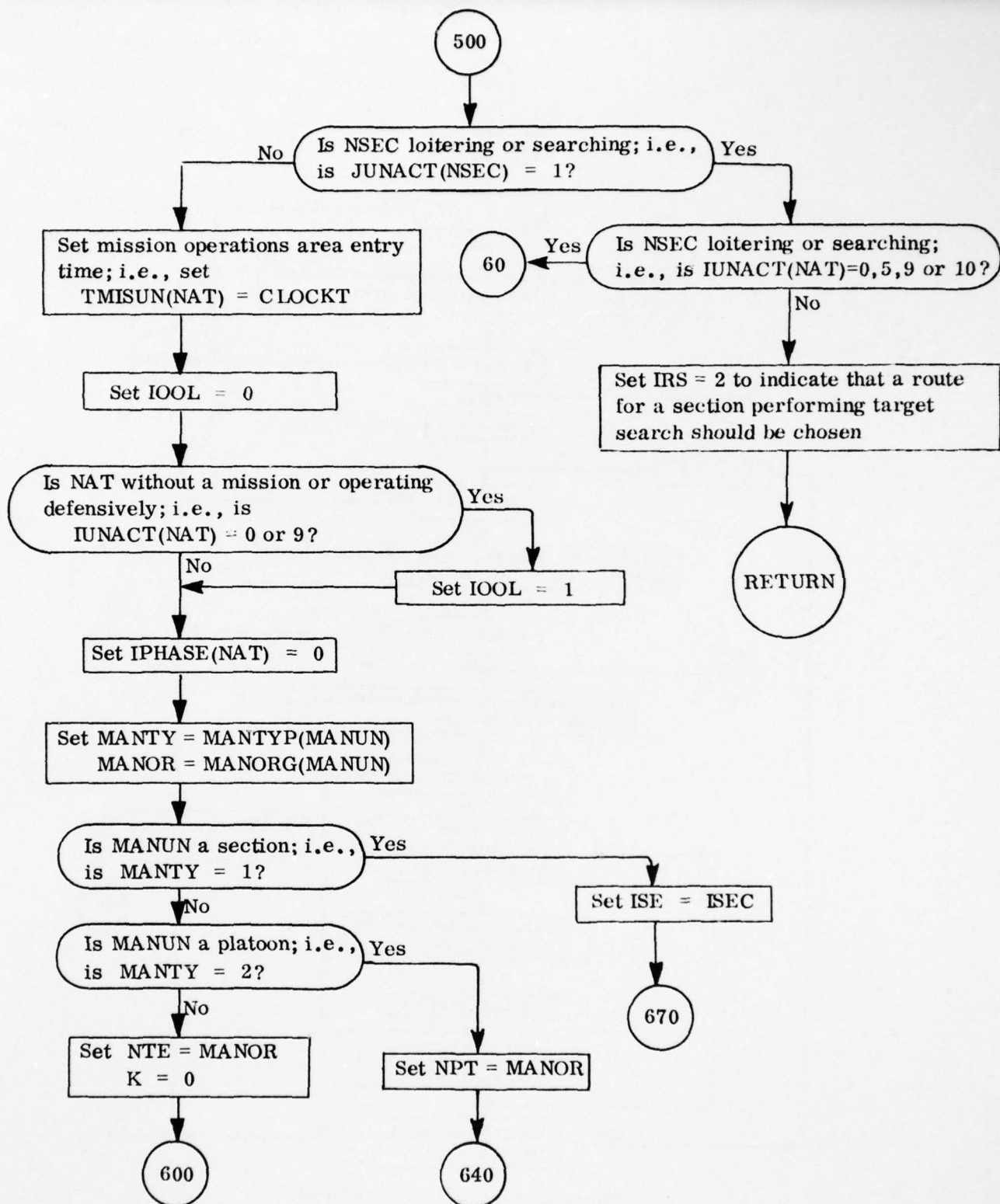
Subroutine FIGSET: Continued



Subroutine FLAGSET: Continued



Subroutine FLGSET: Continued



Subroutine FLGSET: Continued

AD-A040 054

OHIO STATE UNIV COLUMBUS SYSTEMS RESEARCH GROUP
EXTENSION TO THE LAND COMBAT MODEL (DYNCOM). VOLUME 2, SECTION --ETC(U)
DEC 71 G M CLARK, R J WILHELM

F/G 15/7

DAAH01-70-C-0713

UNCLASSIFIED

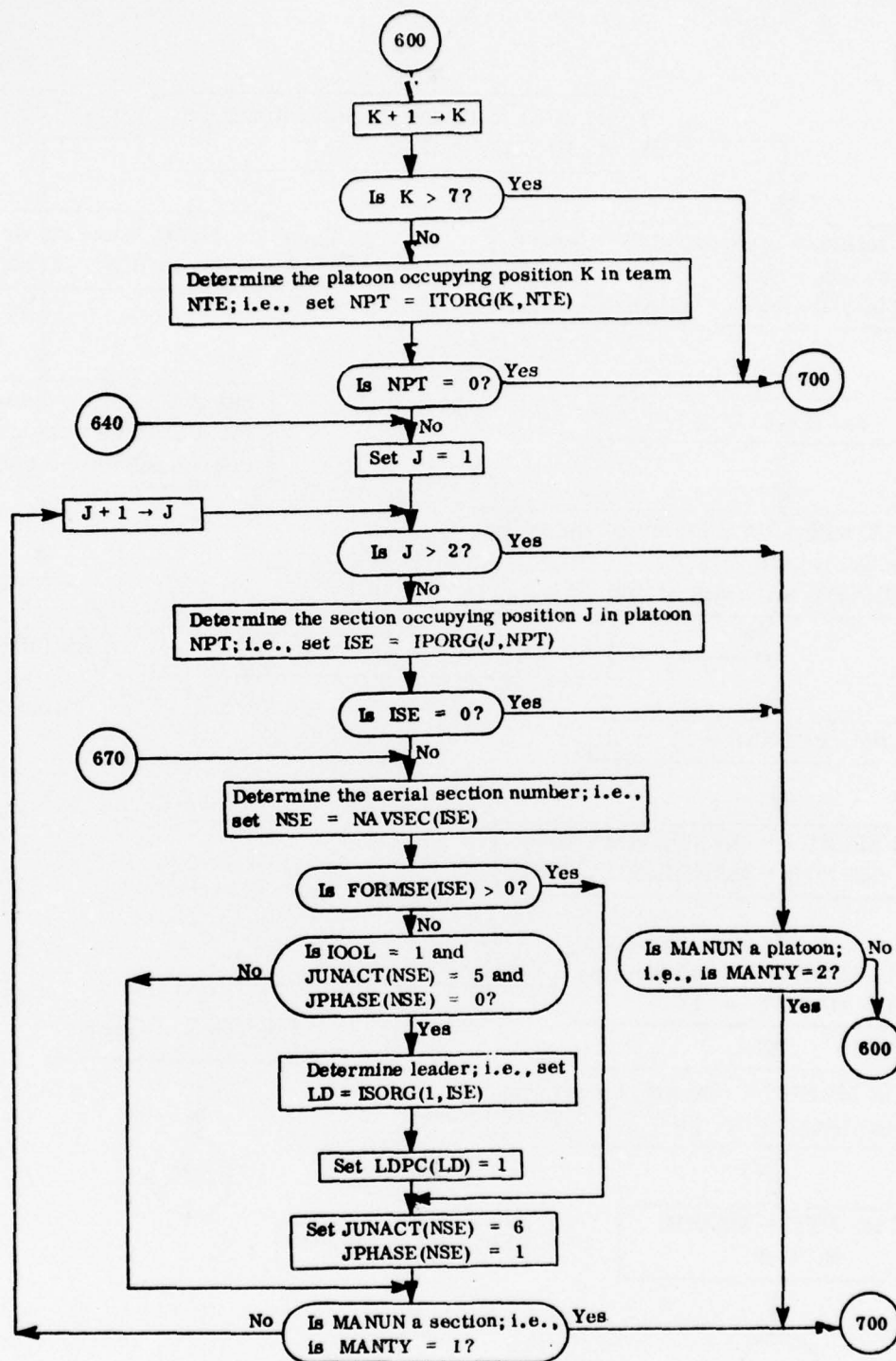
RF-2995-FR 71-2(U)-SEC-2

NL

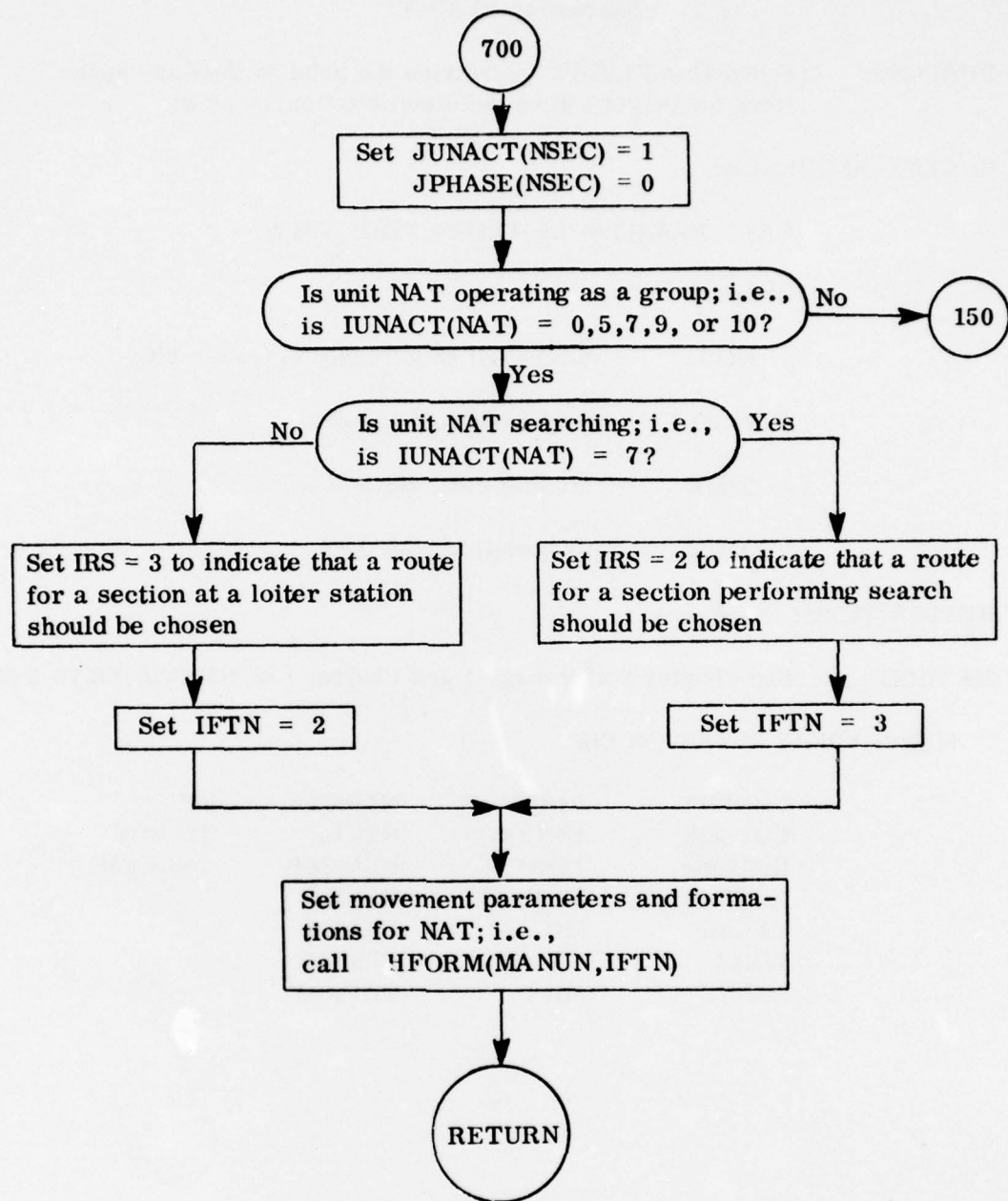
2 OF 6
AD
A040 054







Subroutine FIGSET: Continued



Subroutine FIGSET: Continued

Subroutine FLIGHT

PURPOSE: Subroutine FLIGHT determines the point in time and space when the target enters the missile's field of view.

CALLING SEQUENCE:

CALL FLIGHT(KILL, ITTGG, TIME, THIT)

where

KILL = target kill code resulting from a hit;

ITTGG = target element number

TIME = missile clock time

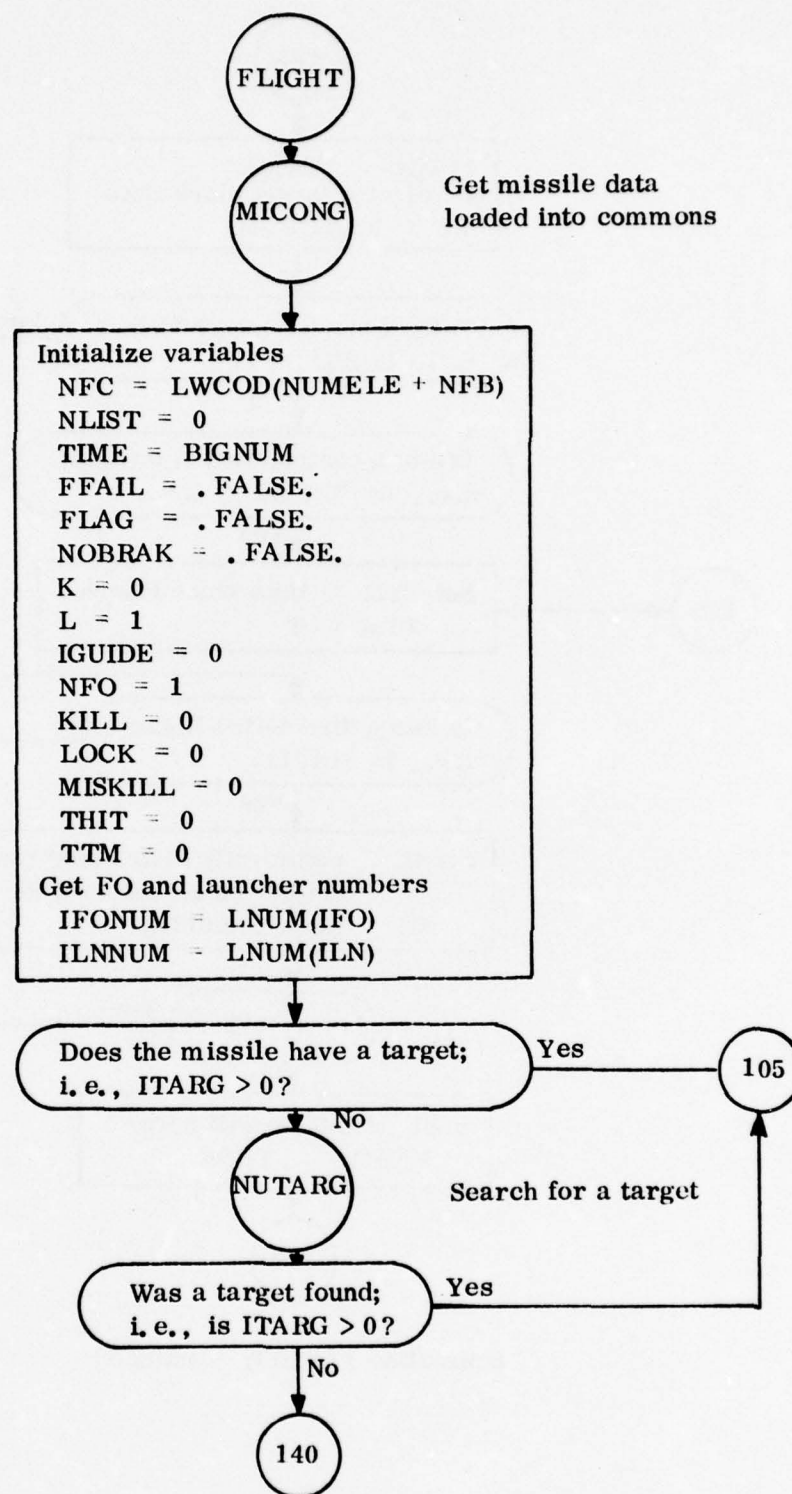
THIT = projected impact time.

RESTRICTIONS: None

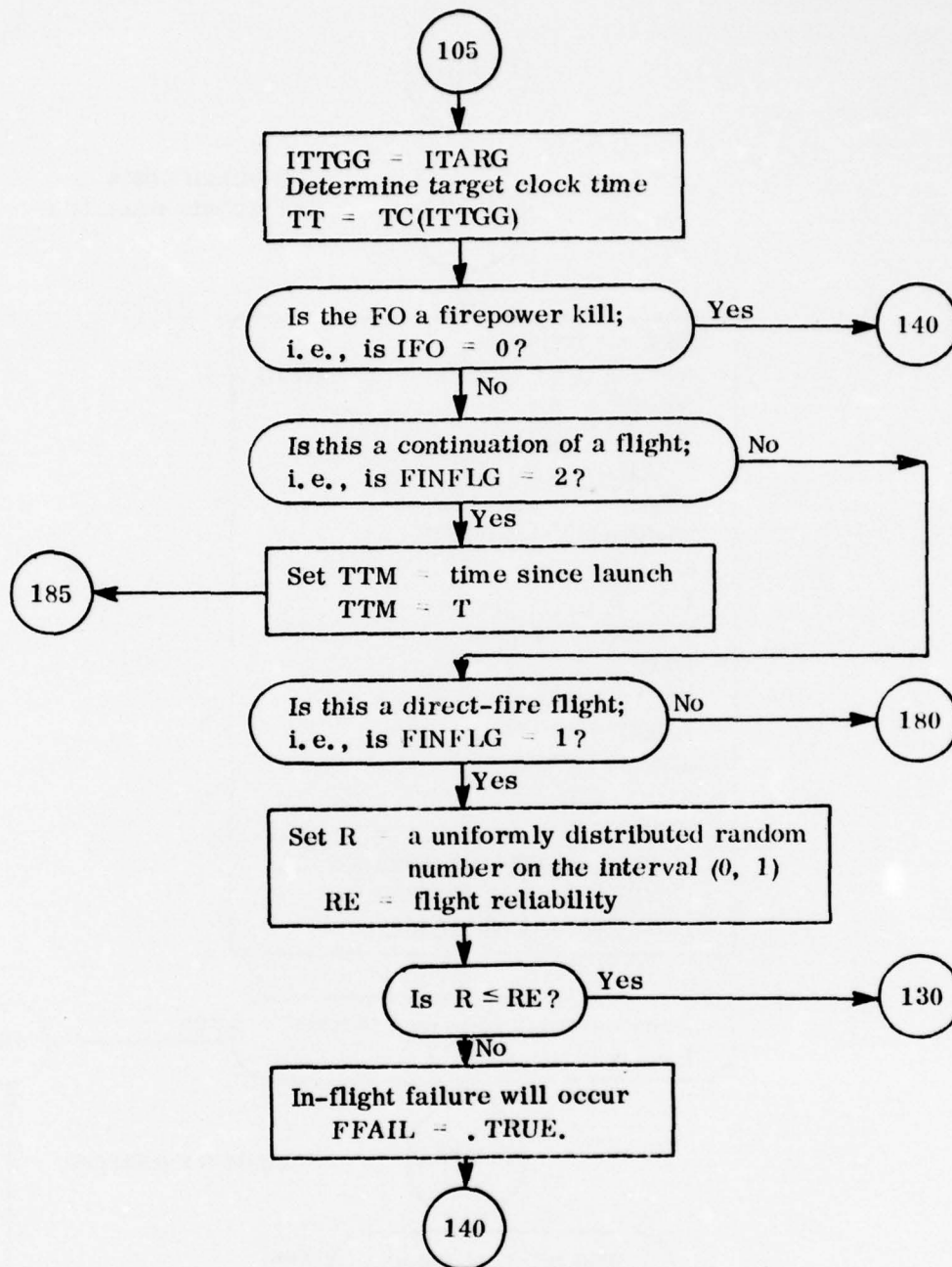
METHOD: See Chapter 2 of Volume 1 and Chapter 1 of RF 2376 FR 70-5 (S).

COMMON AREAS REFERENCED:

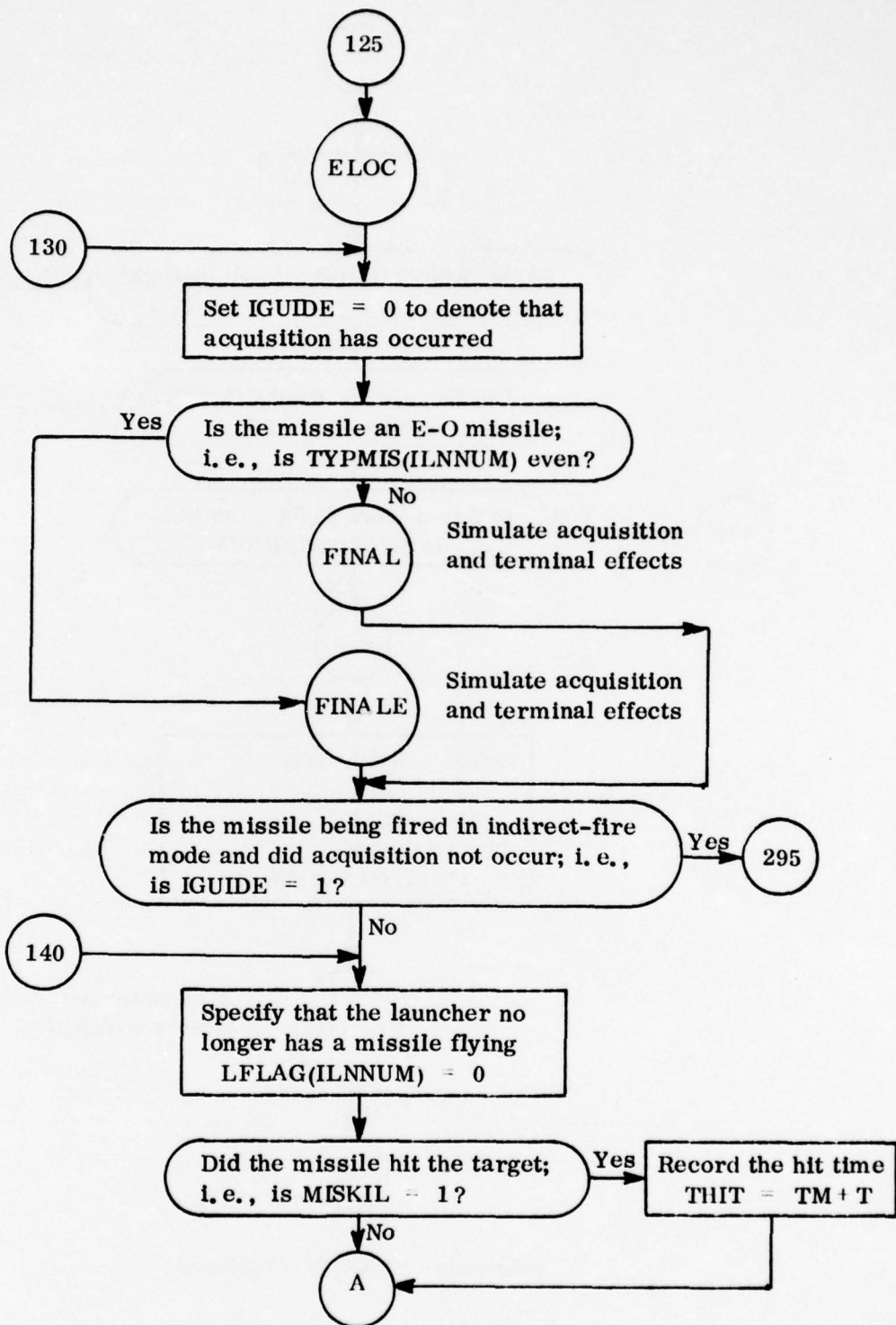
| | | | |
|--------|--------|--------|--------|
| CBNEUT | LNUM | MISHIT | TF |
| ECLOCK | LWCOD | NTELE | TIFRDY |
| IBTAMO | LWSYS | NUMBER | TNEUTM |
| ICECOM | MAINPR | OPEN | |
| LFLAG | MD | PKART | |
| LKILL | MIDATA | STNEUT | |
| LNSET | MIFO | TDFRDY | |



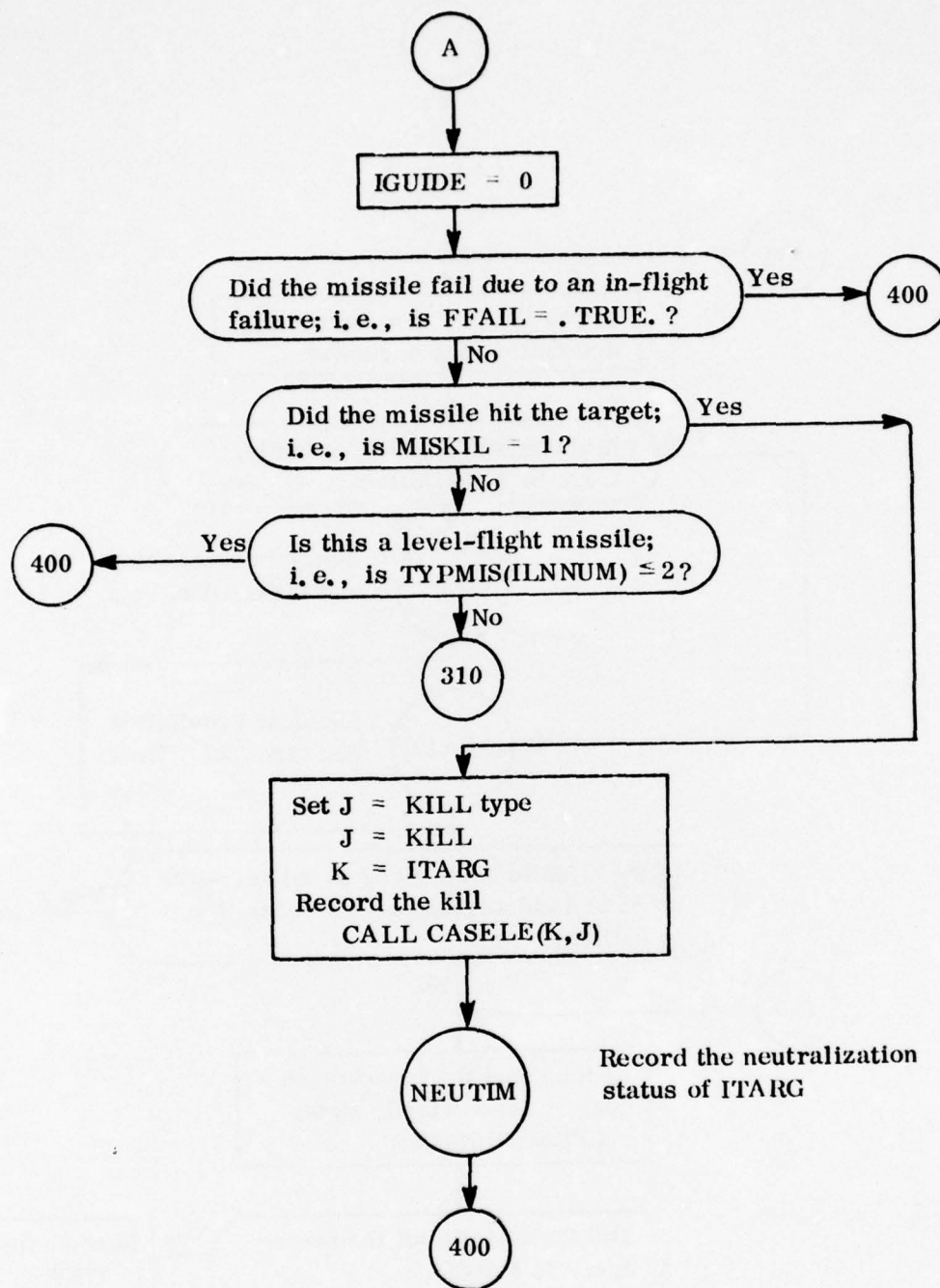
Subroutine FLIGHT: Missile Search for a Target



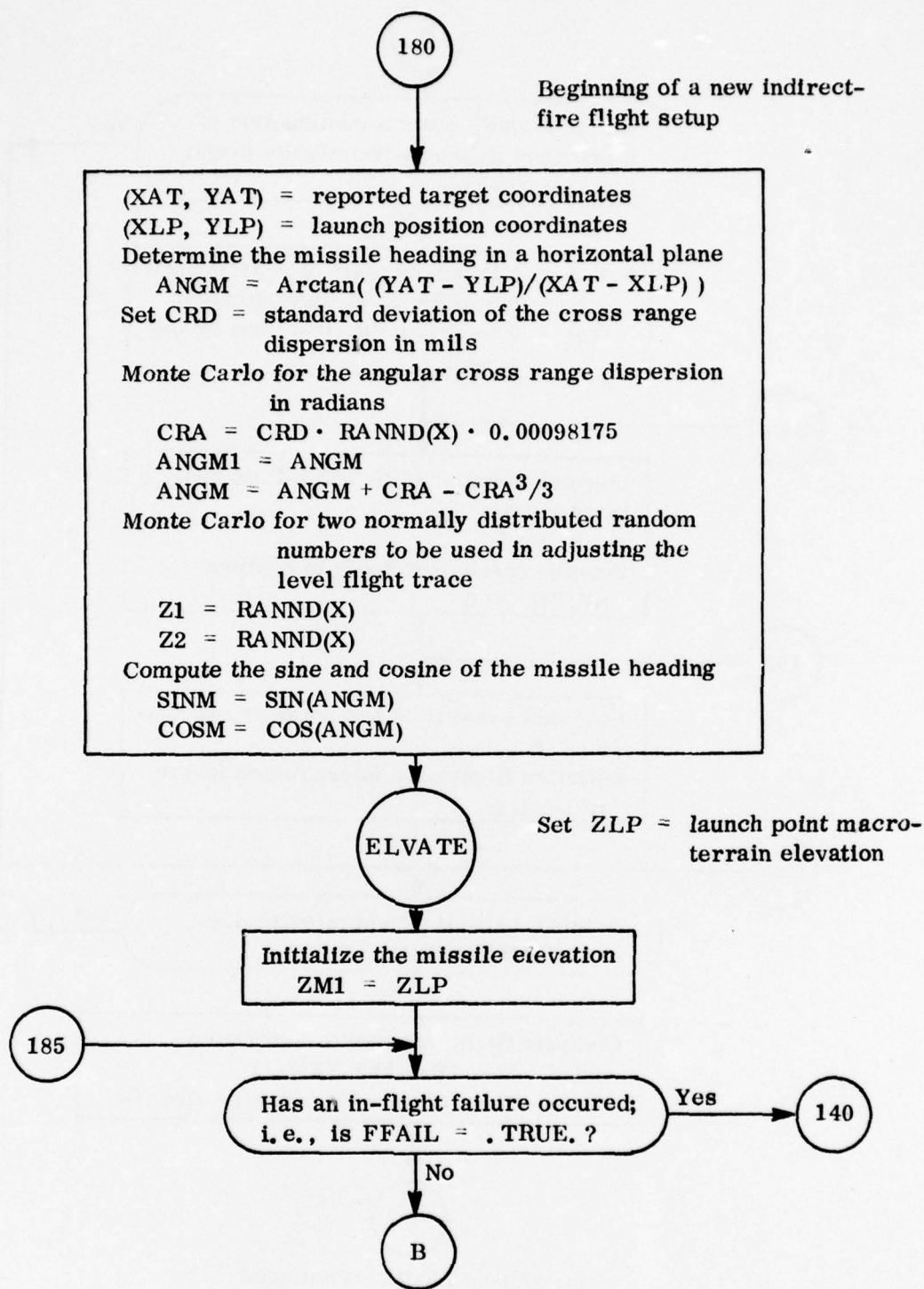
Subroutine FLIGHT: Continued



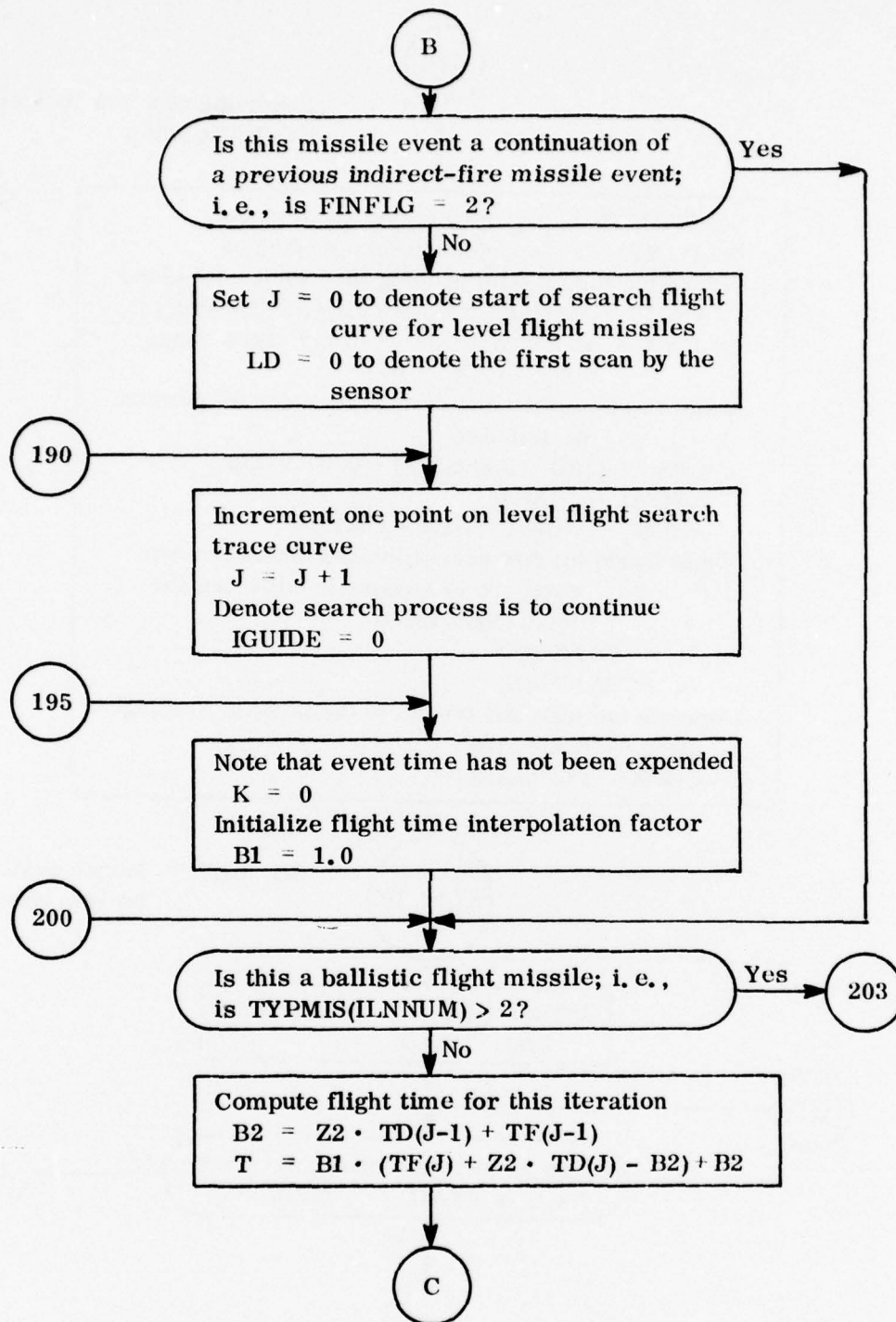
Subroutine FLIGHT: Continued



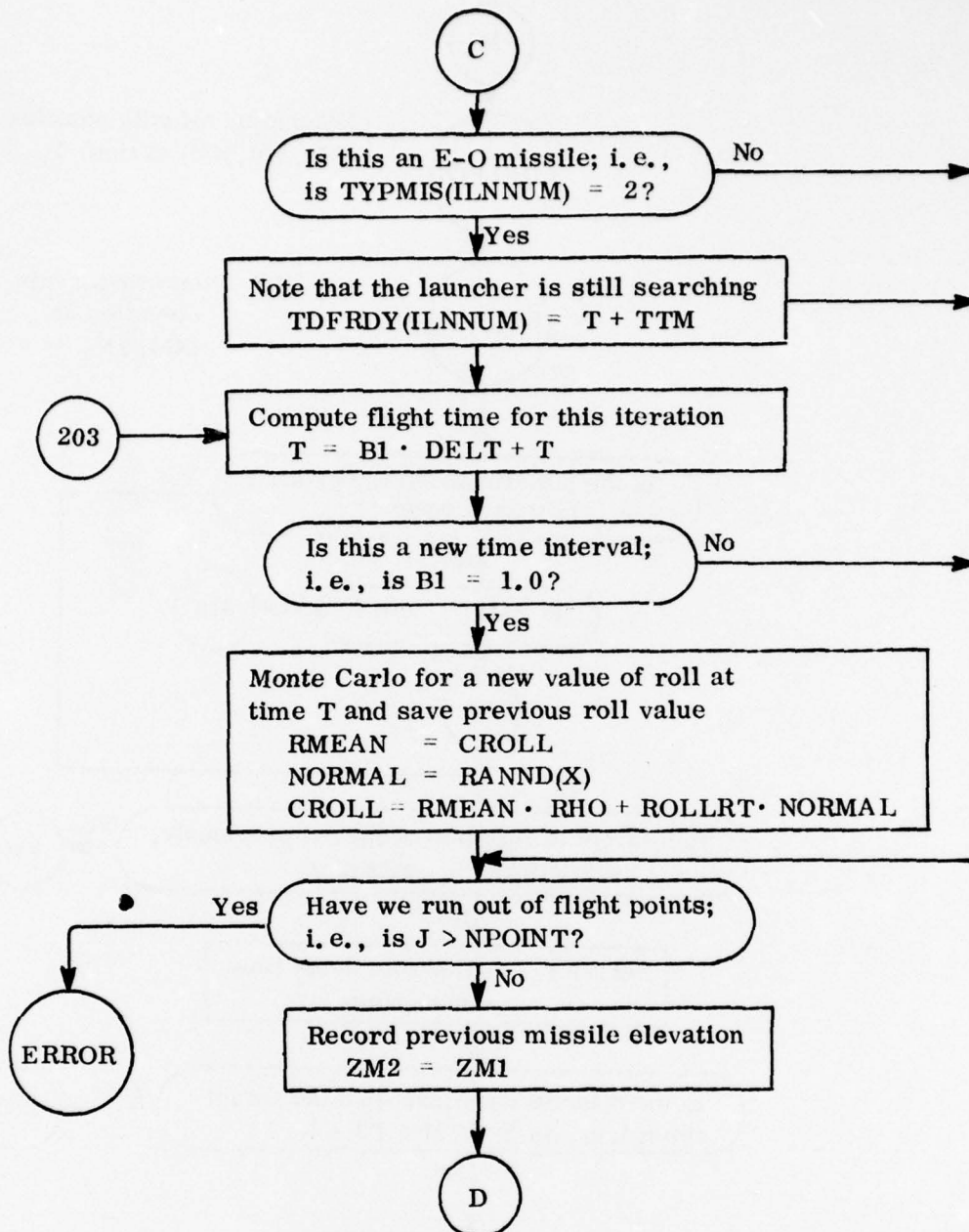
Subroutine FLIGHT: Continued



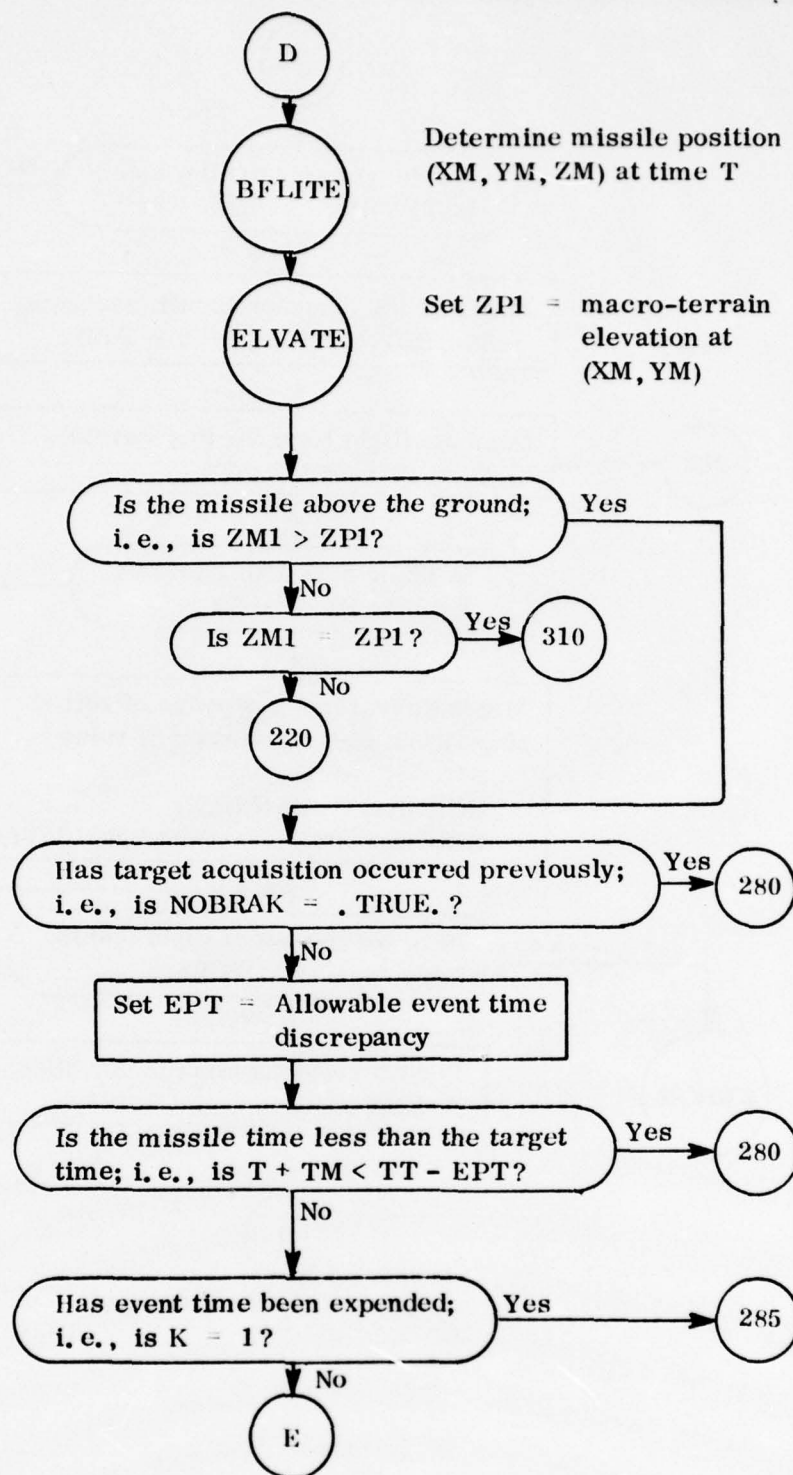
Subroutine FLIGHT: Continued



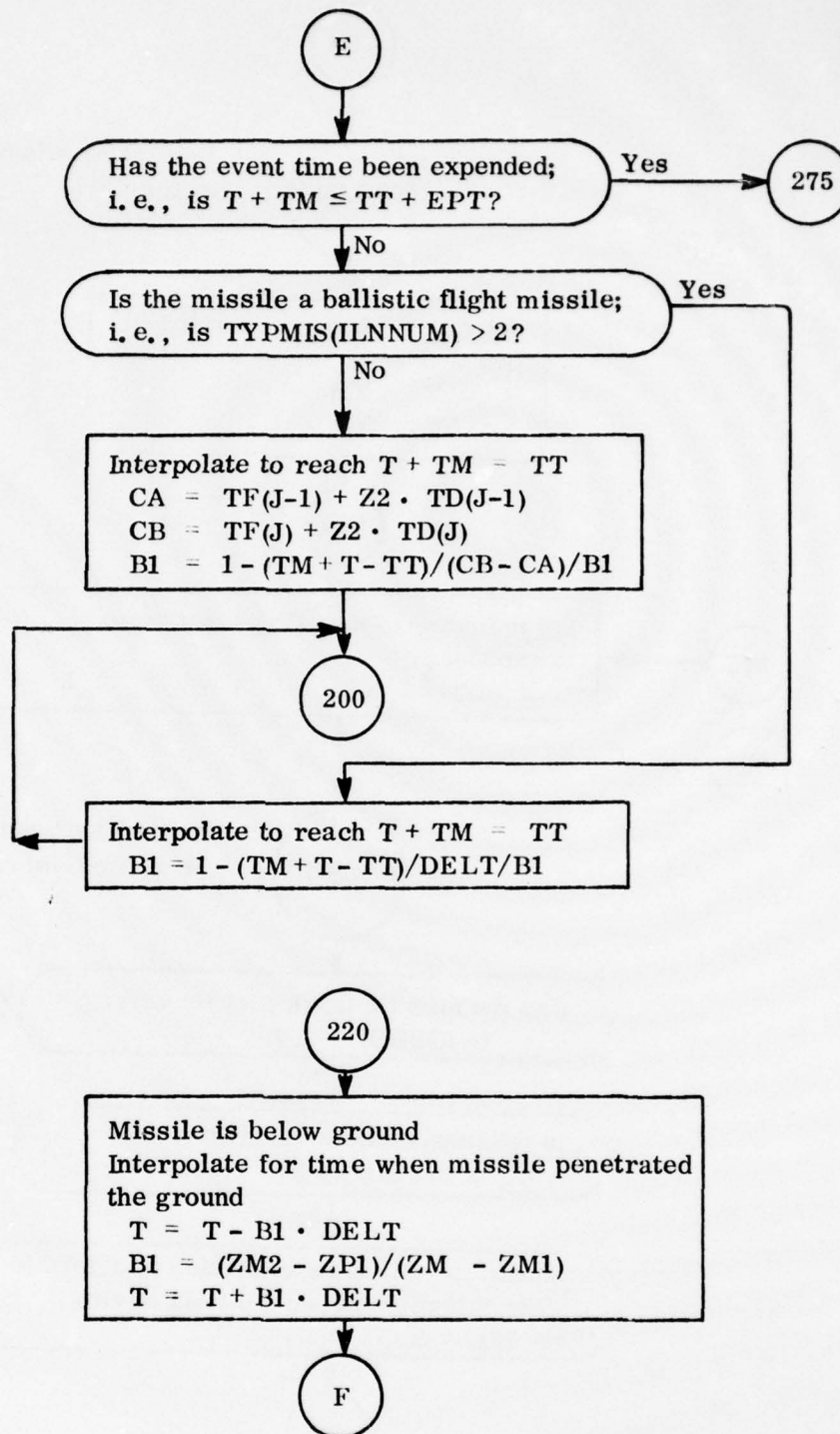
Subroutine FLIGHT: Continued



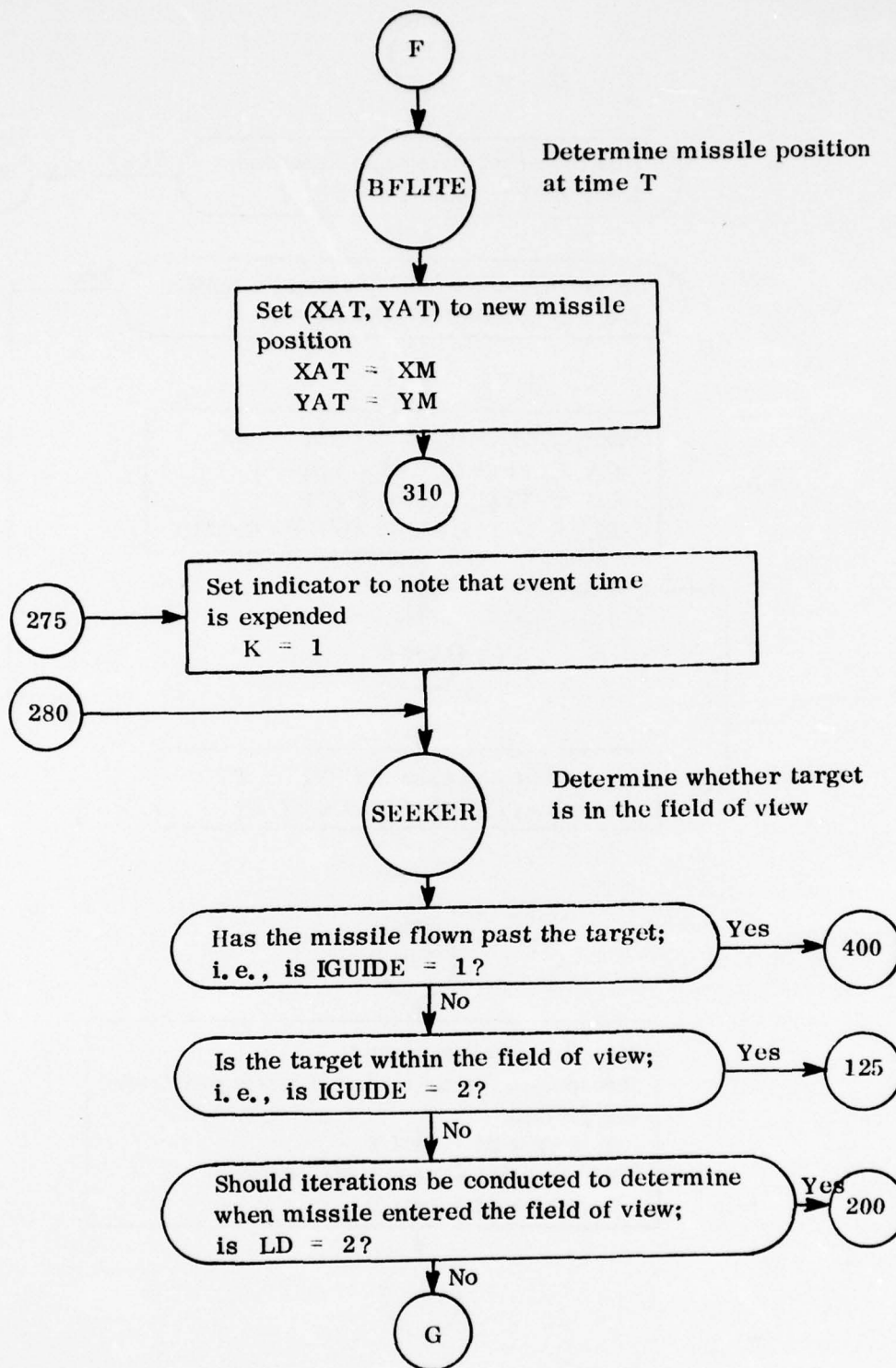
Subroutine FLIGHT: Continued



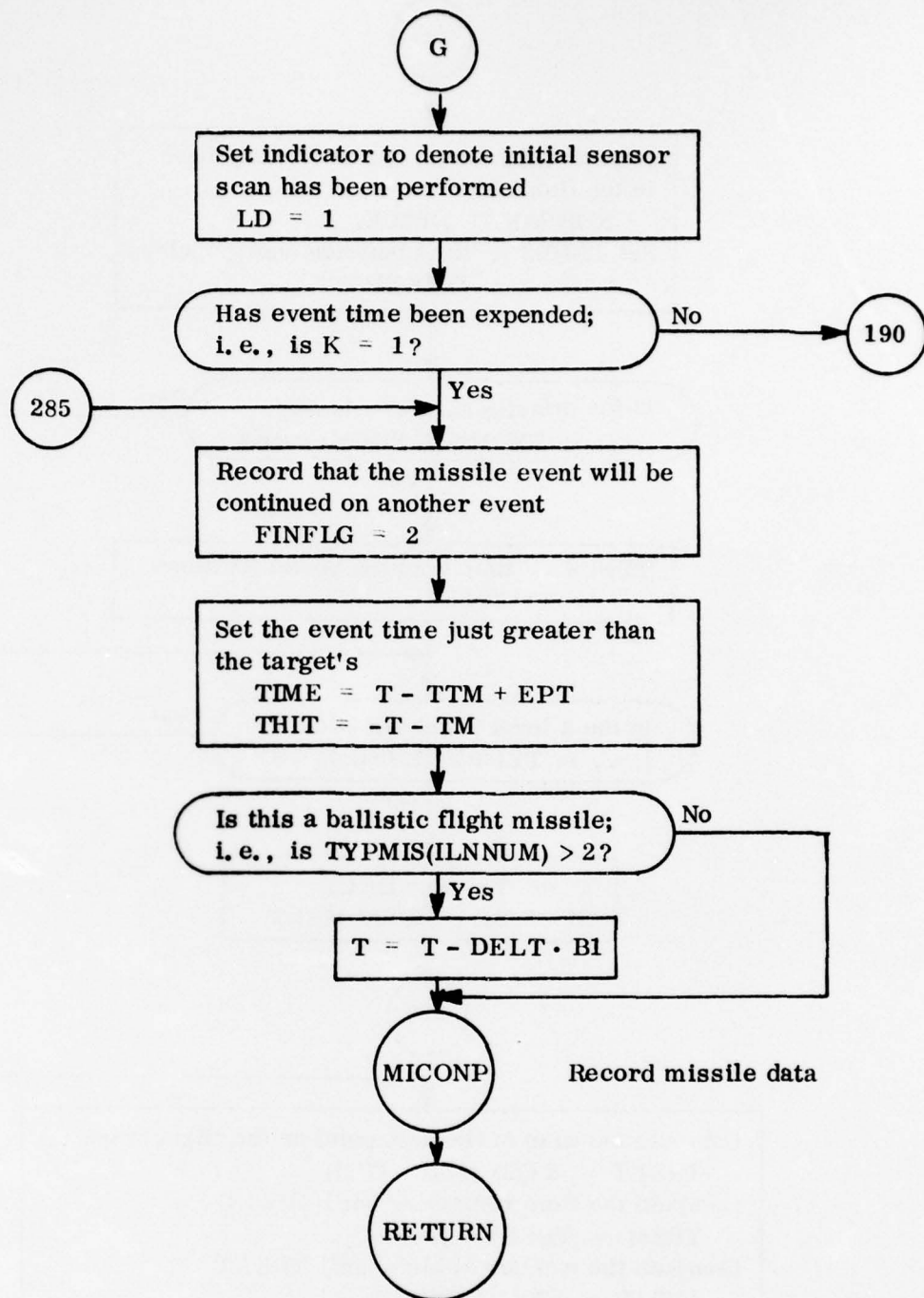
Subroutine FLIGHT: Continued



Subroutine FLIGHT: Continued



Subroutine FLIGHT: Continued



Subroutine FLIGHT: Continued

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Note that the target has previously been
in the field of view
NOBRAK = .TRUE.
Set TBPUS = time between energy pulses
= TIMENP

Is the missile an E-O missile;
i. e., is TYPMIS(ILNNUM) even?

No

Yes

TBPUS - time between visual fixations
= TVFIX

Is the a level flight missile;
i. e., is TYPMIS(ILNNUM) ≤ 2 ?

Yes

No

$T = T + B1 \cdot DELT$
 $B1 = B1 + TBPUS/DELT$

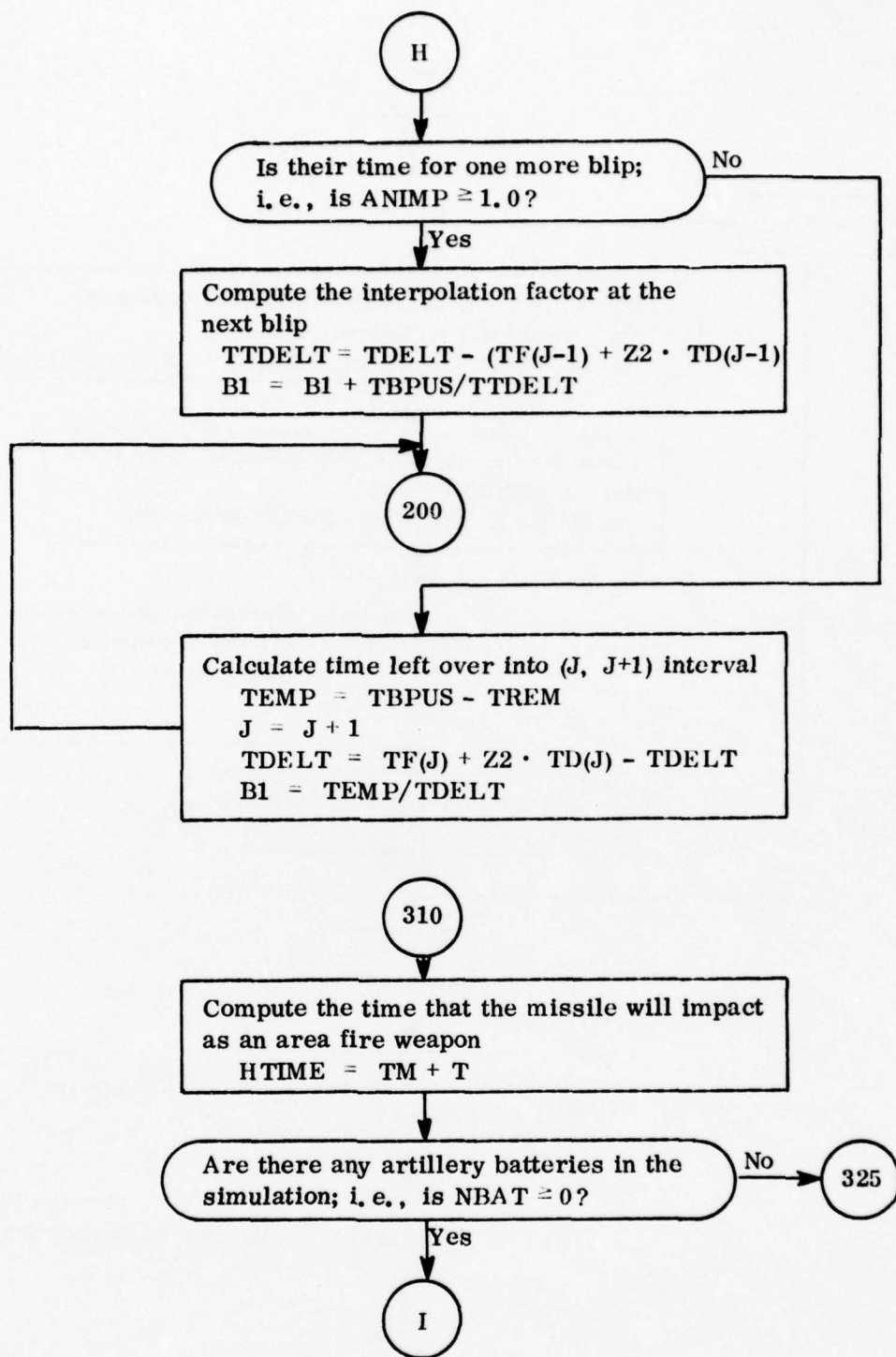
200

Compute the time of the next point on the flight trace
 $TDELT = TF(J) + Z2 \cdot TD(J)$
Compute the time remaining until TDELT
 $TREM = TDELT - T$
Compute the number of blips until TDELT
 $ANIMP = TDELT/TBPUS$

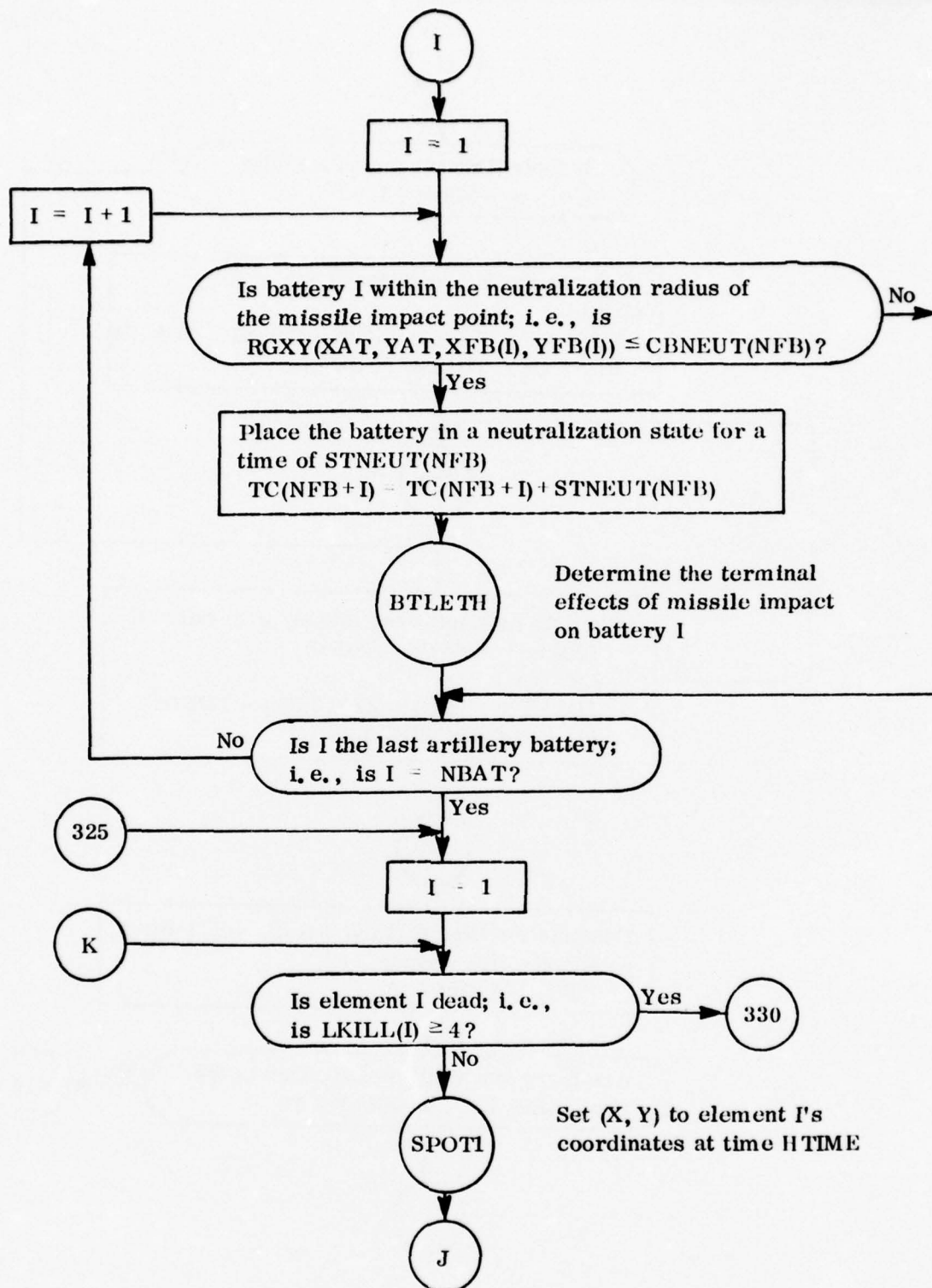
11

Subroutine FLIGHT: Continued

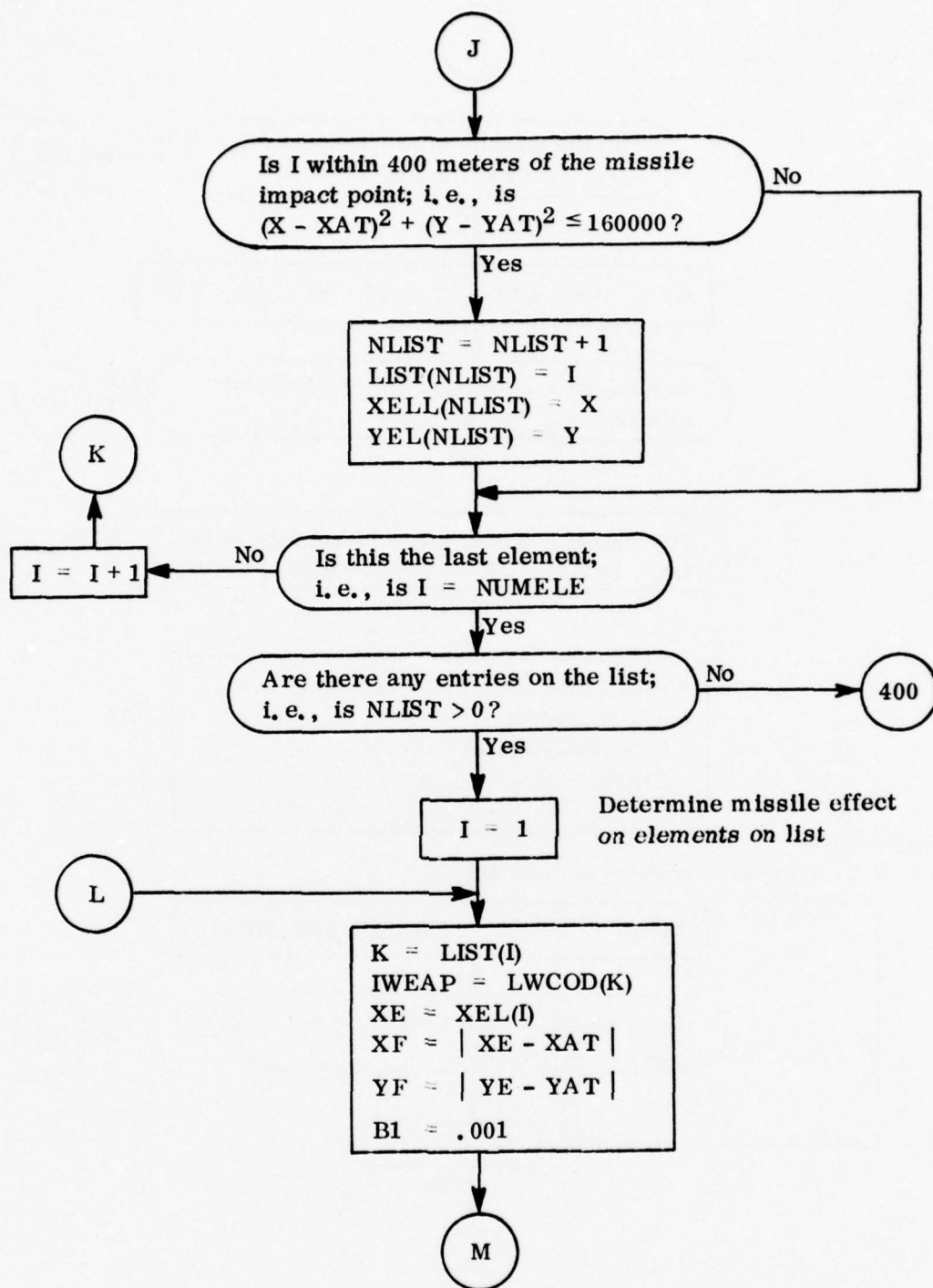
B-358



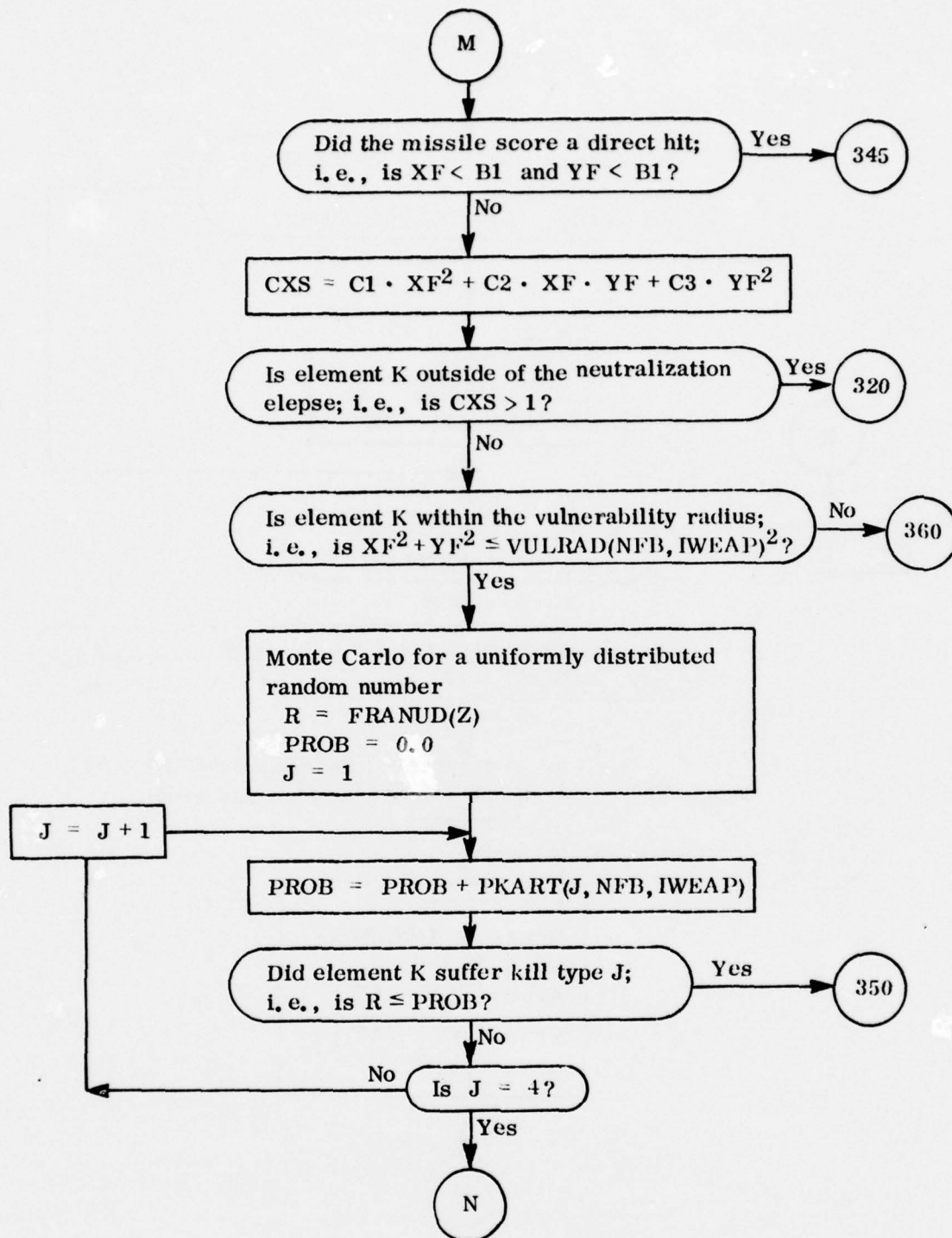
Subroutine FLIGHT: Continued



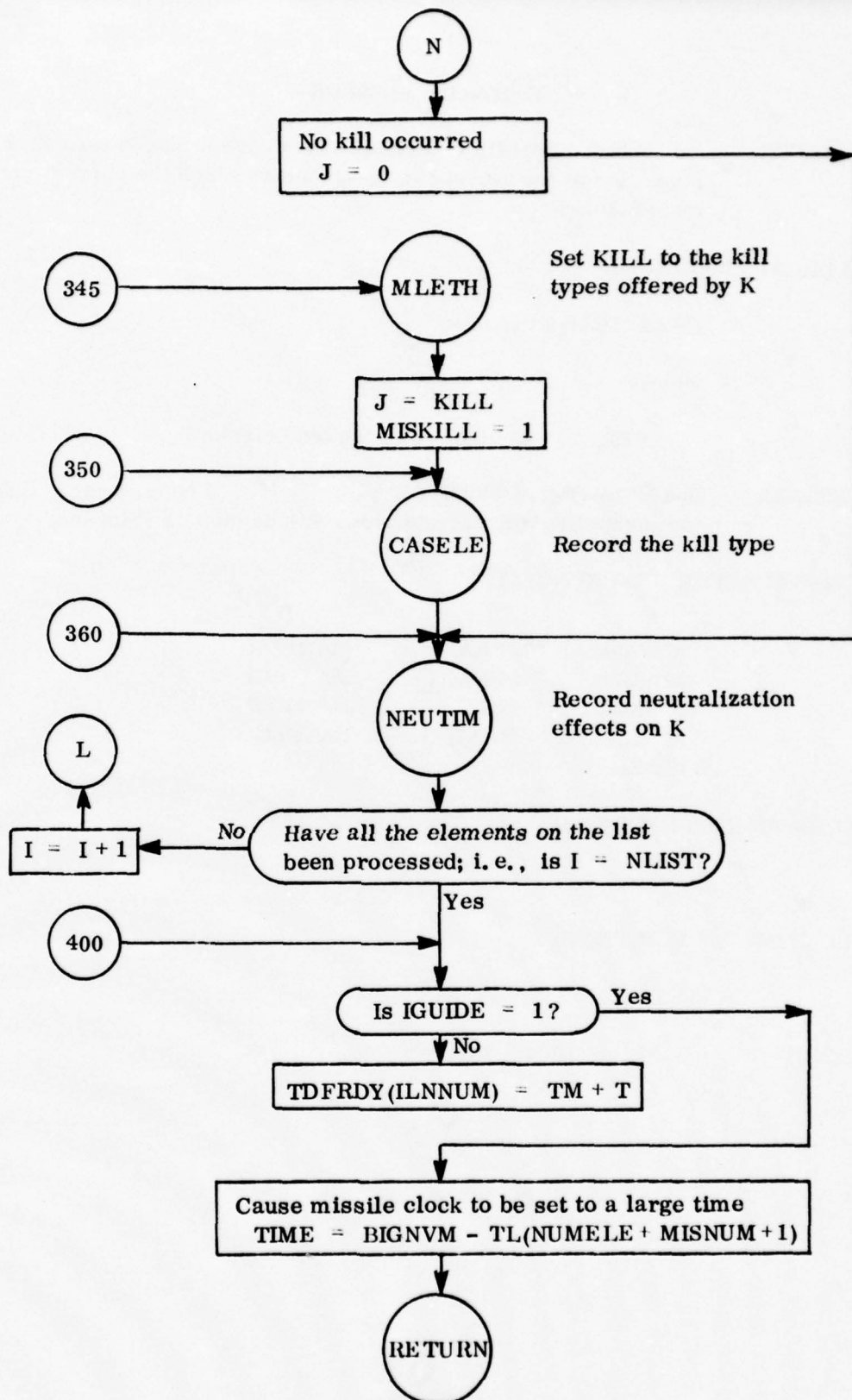
Subroutine FLIGHT: Continued



Subroutine FLIGHT: Continued



Subroutine FLIGHT: Continued



Subroutine FLIGHT: Continued

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Subroutine FRMLDR

PURPOSE: Subroutine FRMLDR determines the element that is leading the formation of the aerial maneuver unit to which the current element belongs.

CALLING SEQUENCE:

CALL FRMLDR(LDR)

where

LDR = the number of the lead element

METHOD: See Chapter 6 of Volume 1. If no element is leading the formation, the current element's number is returned.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| ICECOM | JPHASE | MANLDR |
| IPHASE | JUNACT | MANORG |
| IPORG | LSEC | MANTYP |
| ISORG | MANHEL | NAVSEC |
| ITORG | | |

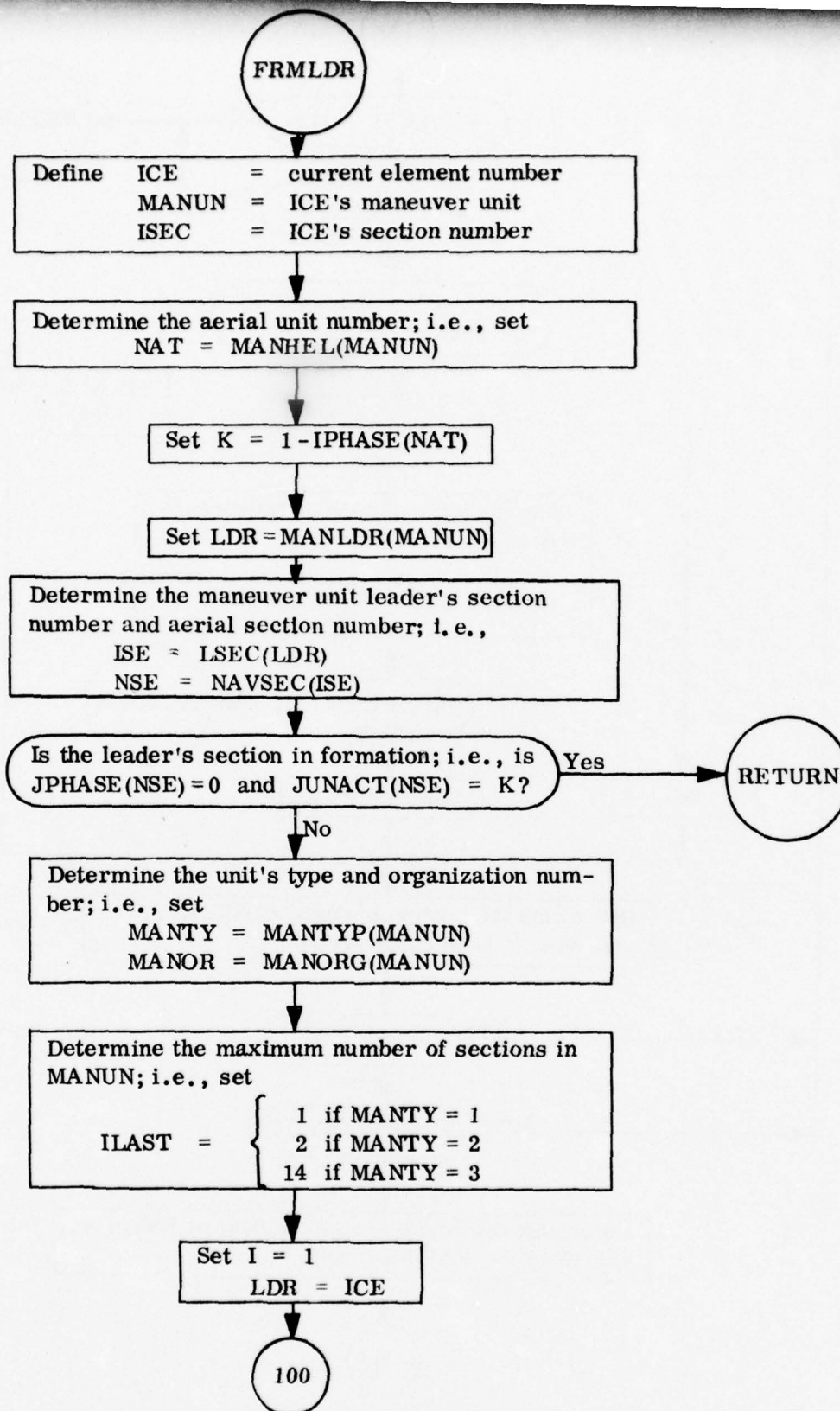
SUBROUTINES REQUIRED:

None

FRMLDR CALLED FROM:

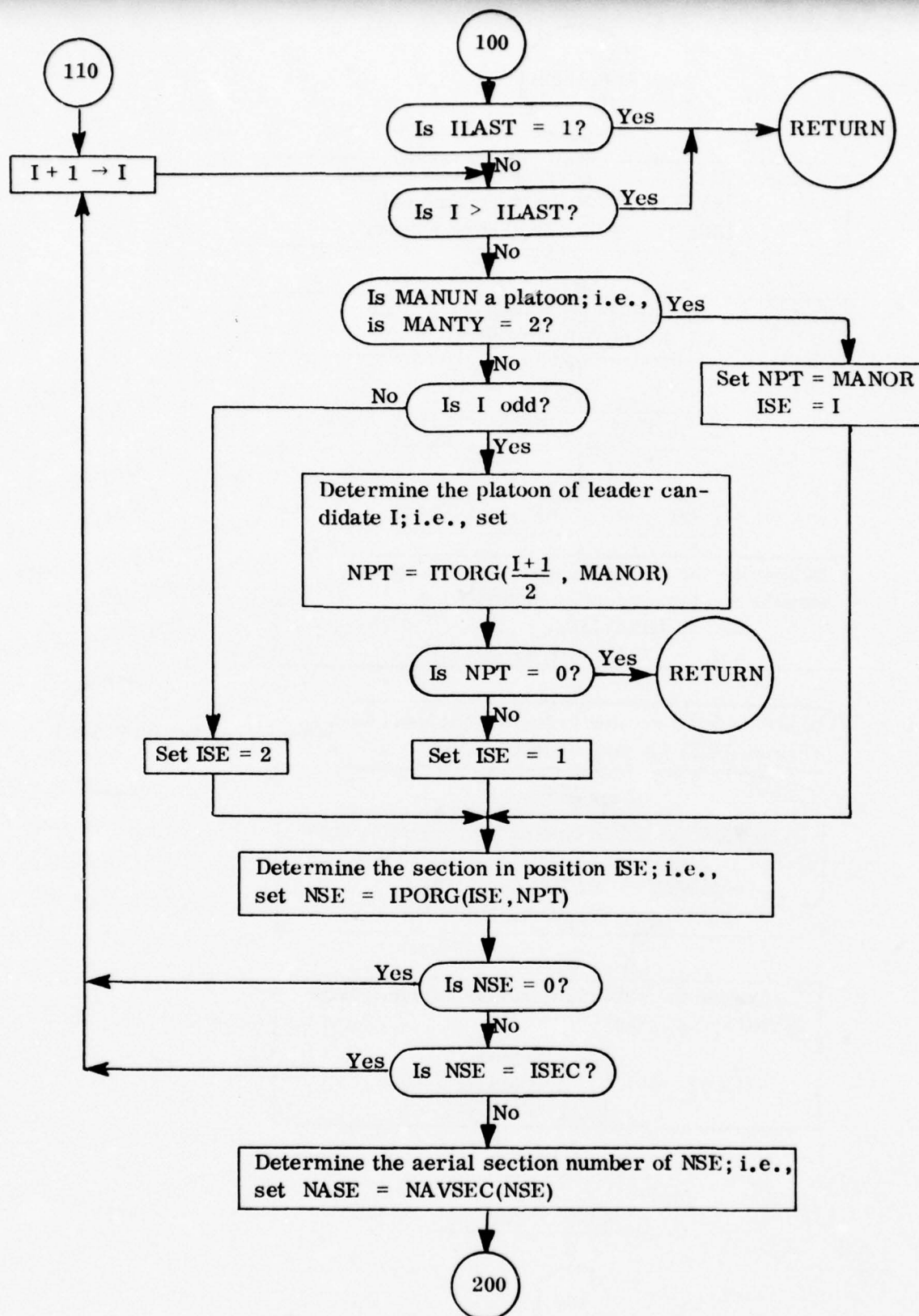
RTJOIN

LENGTH: $518_{16} = 1304_{10}$ bytes

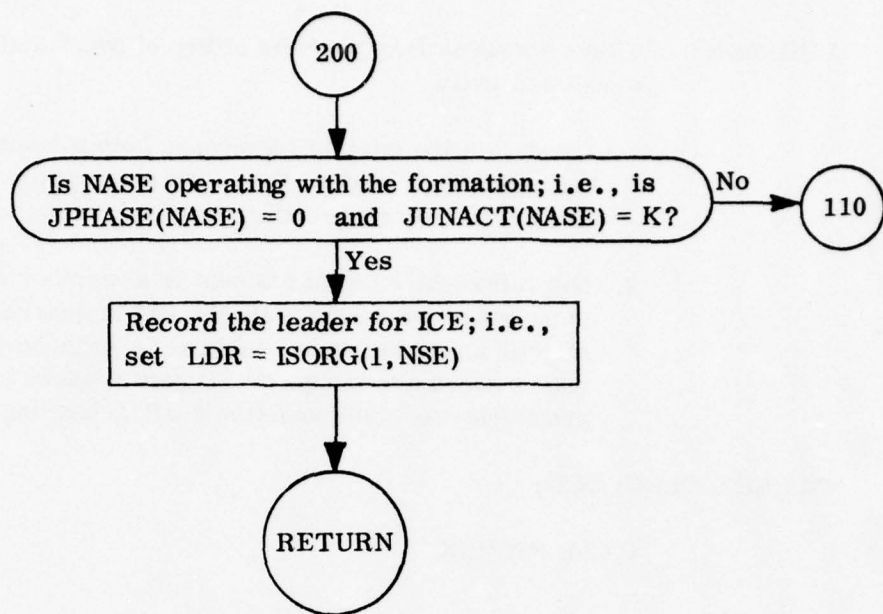


Subroutine FRMLDR: Determining the Lead Element
in an Aerial Unit Formation

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Subroutine FRMLDR: Continued



Subroutine FRMLDR: Continued

Subroutine FSCHEK

PURPOSE: This subroutine may perform either of two functions following a movement event.

1. Given that the current element is both a launcher and a maneuver unit leader, the coordinates of the launcher unit are set to the new coordinates of its leader, or
2. Given that the current element is a member of an attacking or delaying maneuver unit, the list of search-and-destroy trigger areas for aerial vehicles is scanned to determine if one or more are triggered. A fire request is placed on the ground-to-air communicator's FRL, barring a conflict.

CALLING SEQUENCE:

CALL FSCHEK

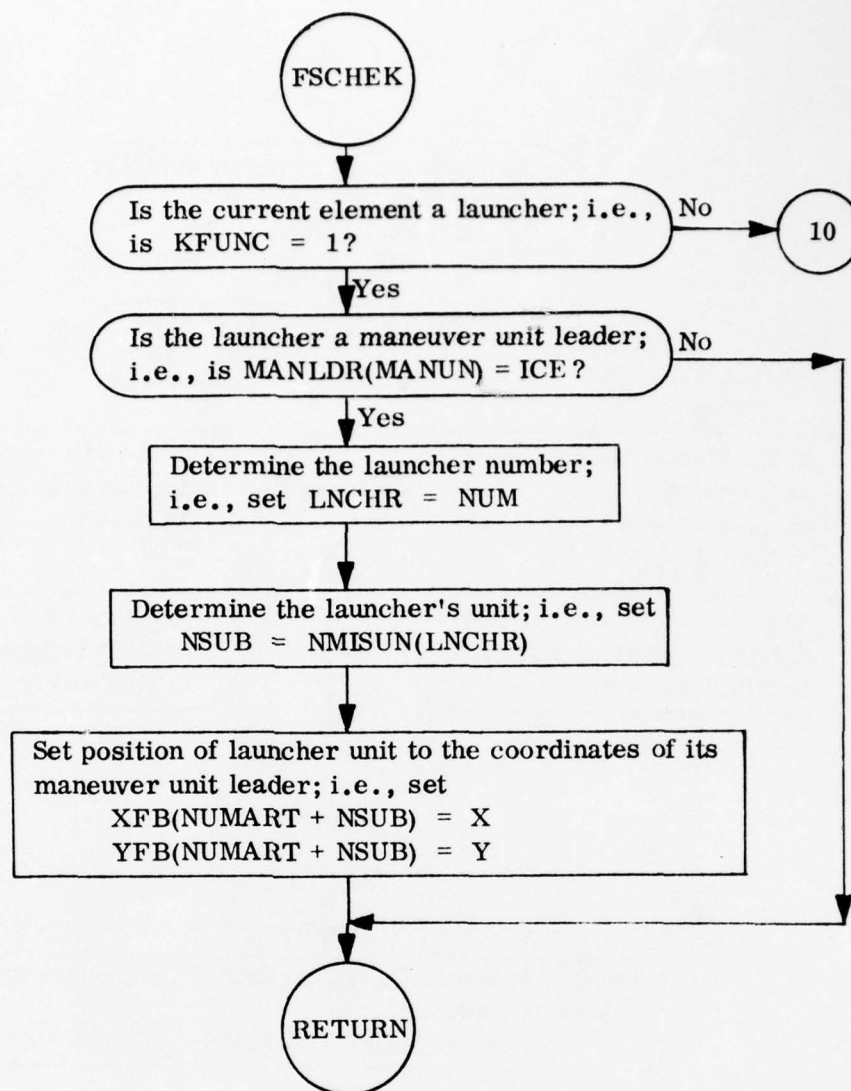
METHOD: See Chapter 2 in RF 2978 FR 71-3A (U).

COMMON AREAS REFERENCED:

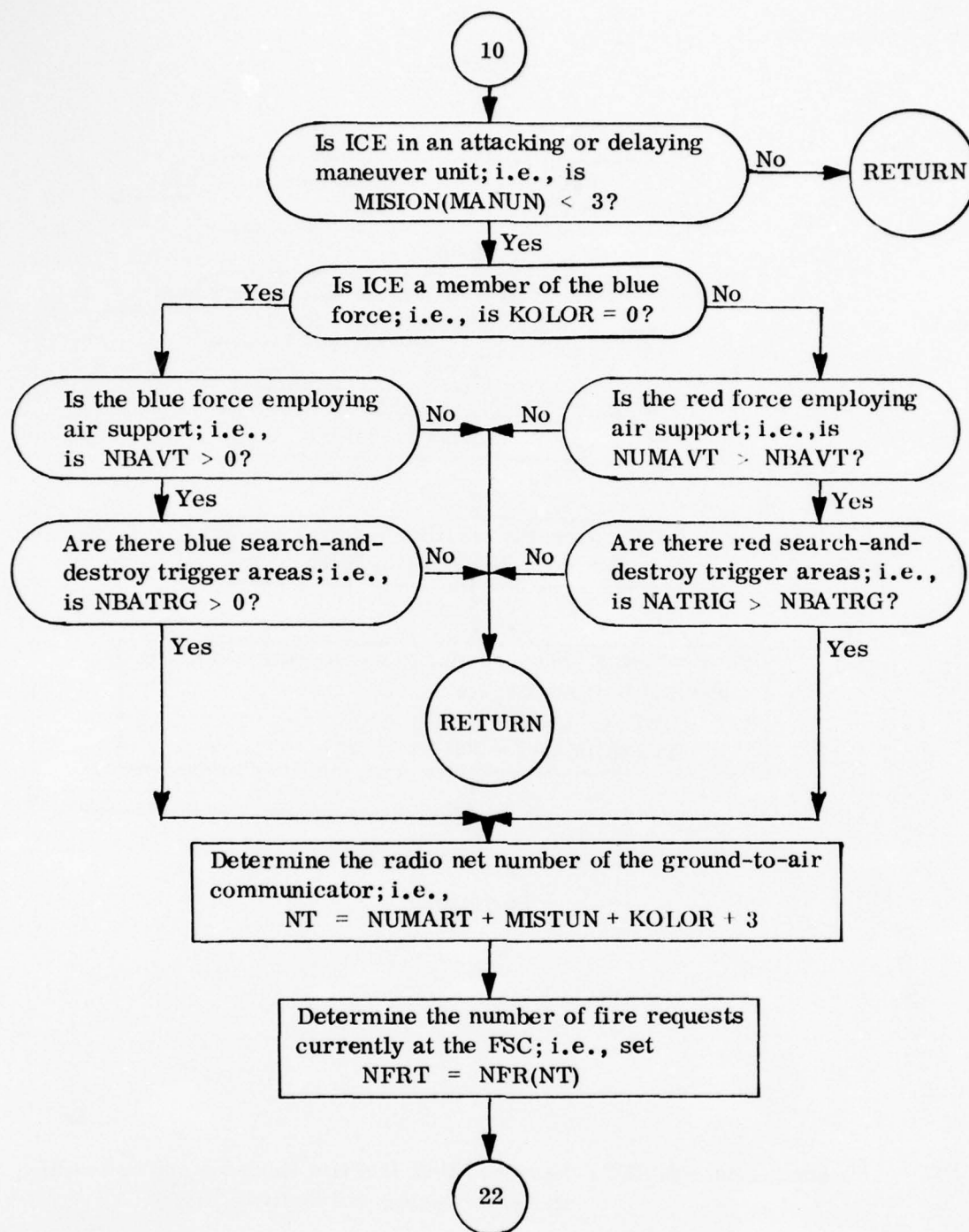
| | | |
|--------|--------|--------|
| DURON | MISION | NUMBER |
| DURRL | MISTYP | NXCONC |
| ECLOCK | NCONC | NXFRL |
| ICECOM | NFOFR | XCONC |
| INTRIG | NFR | XFB |
| IPRIRR | NFRMAX | XFRL |
| ITRIG | NMISUN | YCONC |
| KPTFRL | NRNDAT | YFB |
| MANLDR | NRNDFR | YFRL |
| MISFRL | NTELE | |

SUBROUTINES REQUIRED:

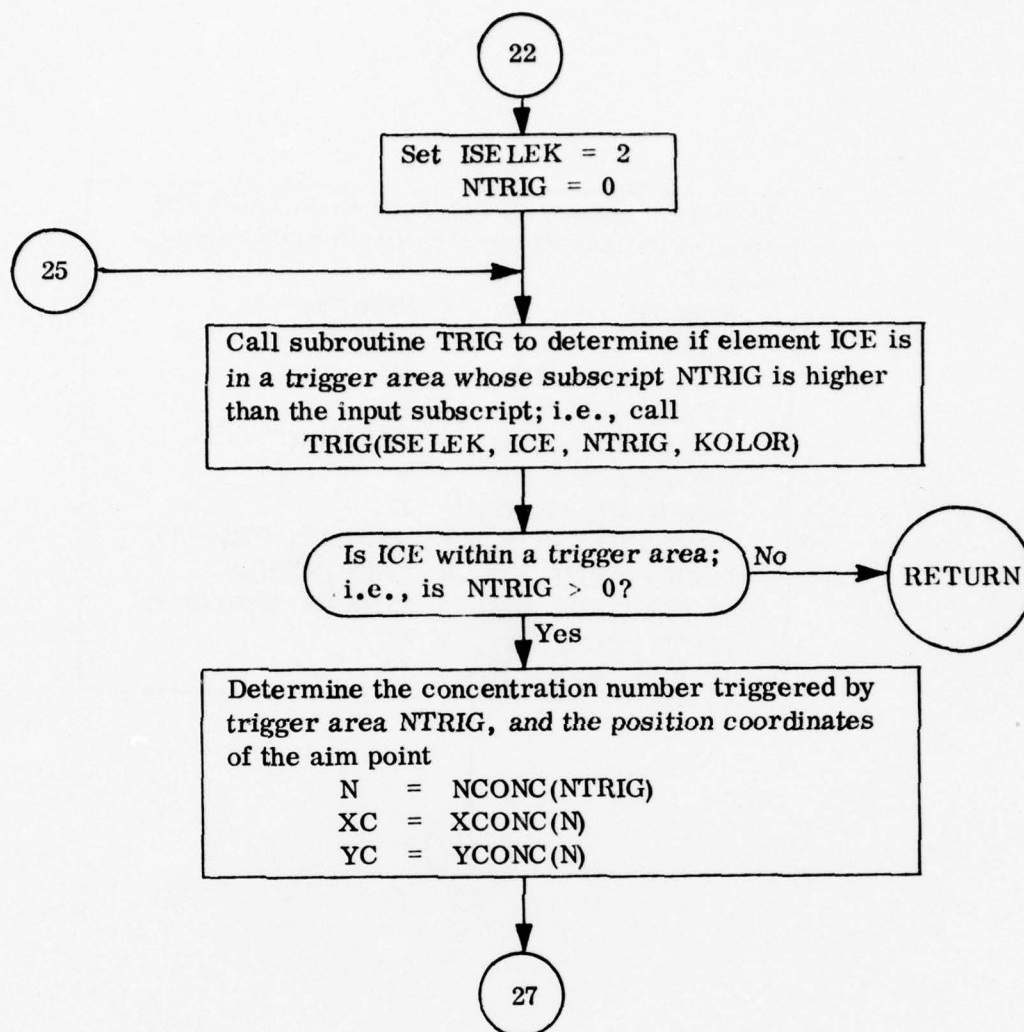
TRIG



Subroutine FSCHEK: Launcher Unit Position Revision and Selecting
an Aerial Search and Destroy Target



Subroutine FSCHEK: Continued



Subroutine FSCHEK: Continued

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Increment number of assignments on FSC's fire-
request list and assign the search-and-destroy
mission

| | | |
|------------------|---|--------------------|
| NFR(NT) | = | NFR(NT) + 1 |
| NFRT | = | NFR(NT) |
| XFRL(NFRT, NT) | = | XC |
| YFRL(NFRT, NT) | = | YC |
| NXFRL(NFRT, NT) | = | NXCONC(N) |
| NFOFR(NFRT, NT) | = | 0 |
| MISFRL(NFRT, NT) | = | 3 |
| NRNDFR(NFRT, NT) | = | NRNDAT(NTRIG-20) |
| IPRIRR(NFRT, NT) | = | ITRIG(NTRIG) |
| DURRL(NFRT, NT) | = | TC(ICE) + DURON(N) |
| MISTYP(NFRT, NT) | = | 0 |
| KPTFRL(NFRT, NT) | = | 1 |

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Subroutine FSCHEK: Continued

Subroutine FSCMON

PURPOSE: Subroutine FSCMON is designed to represent the monitoring activities of the fire-support coordinator when requests for artillery or MISTIC fire support are directed to the fire direction centers.

CALLING SEQUENCE:

CALL FSCMON(NFO, KOLOR, NTOMUF, TIME)

where

NFO = number of the forward observer initiating the request (input)

KOLOR = $\begin{cases} 0 & \text{if the new fire request was initiated} \\ & \text{by a member of the blue force} \\ 1 & \text{if otherwise (input)} \end{cases}$

NTOMUF = $\begin{cases} \text{intense fire fight indicator} \\ 1 & \text{if intense fire fight} \\ 0 & \text{if otherwise} \end{cases}$

TIME = forward observer event time (output).

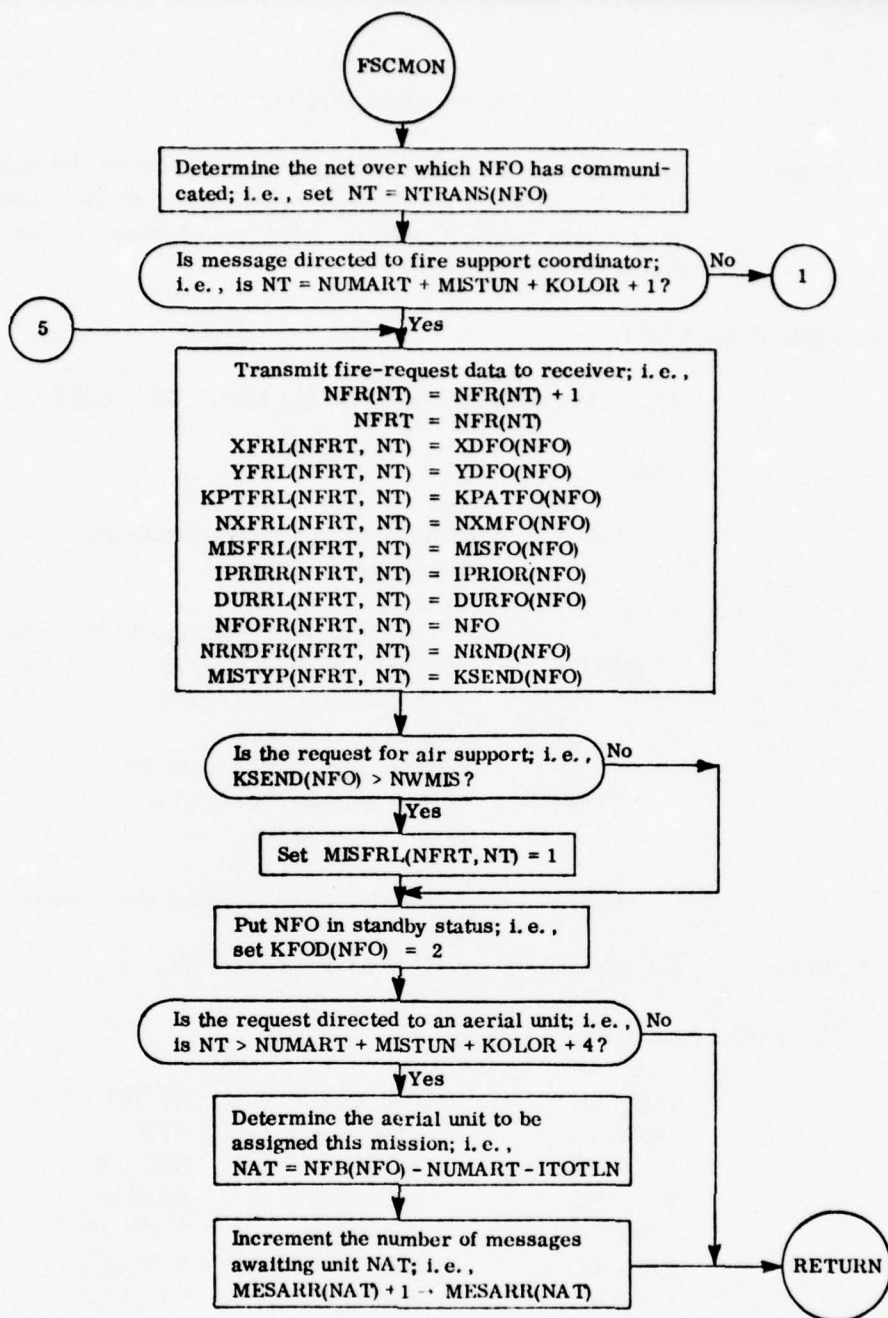
METHOD: See Chapter 2 in RF 2978 FR 71-3A (U).

COMMON AREAS REFERENCED:

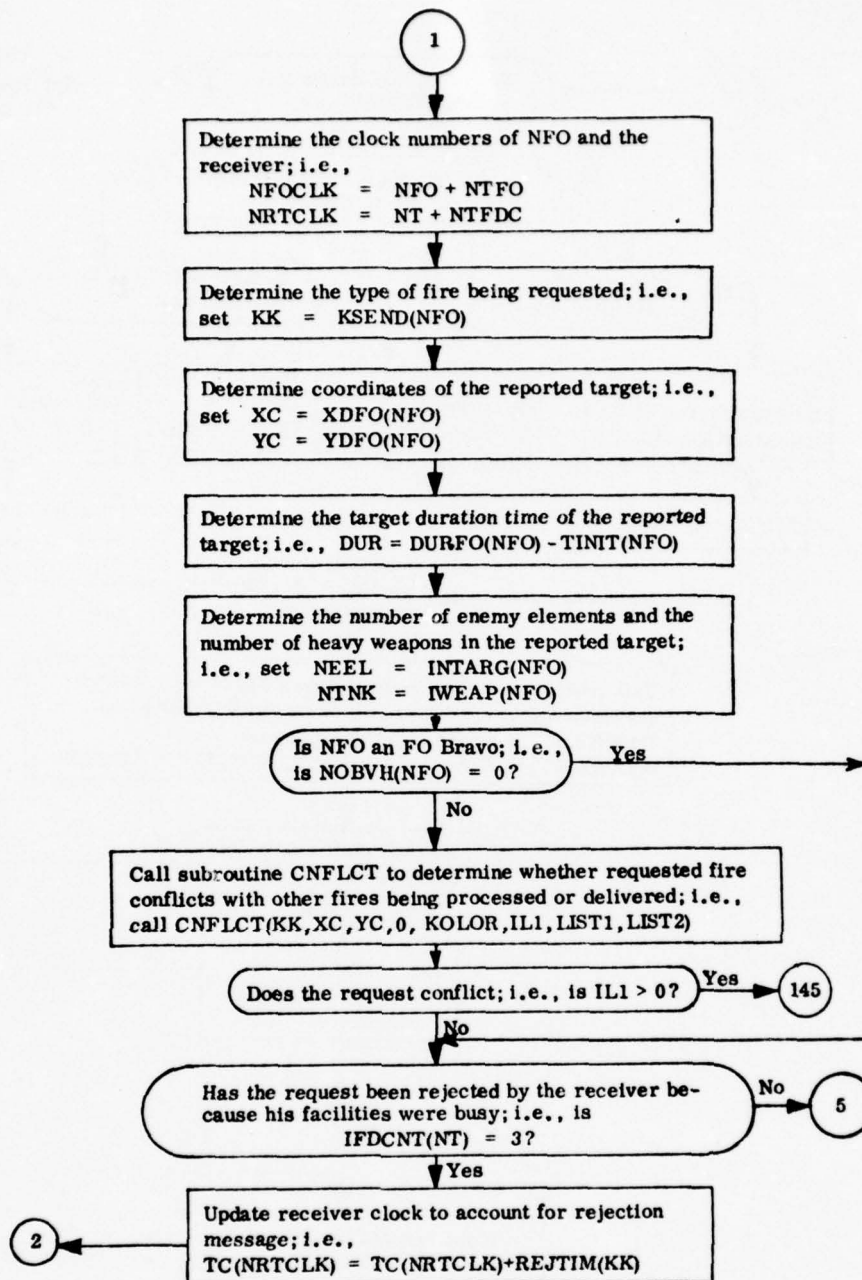
| | | | |
|--------|--------|--------|--------|
| DURFO | KPATFO | NFOFR | NXMFO |
| DURRL | KPTFRL | NFR | REJTIM |
| ECLOCK | KSEND | NOBVN | SEQPAR |
| FSCTIM | MESARR | NRND | TIMARR |
| IFDCNT | MISFO | NRNDFR | TINIT |
| INTARG | MISFRL | NTELE | XDFO |
| IPRIOR | MISTYP | NTRANS | XFRL |
| IPRIRR | NCON | NUMBER | YDFO |
| IWEAP | NFB | NXFRL | YFRL |
| KFOD | | | |

SUBROUTINES REQUIRED:

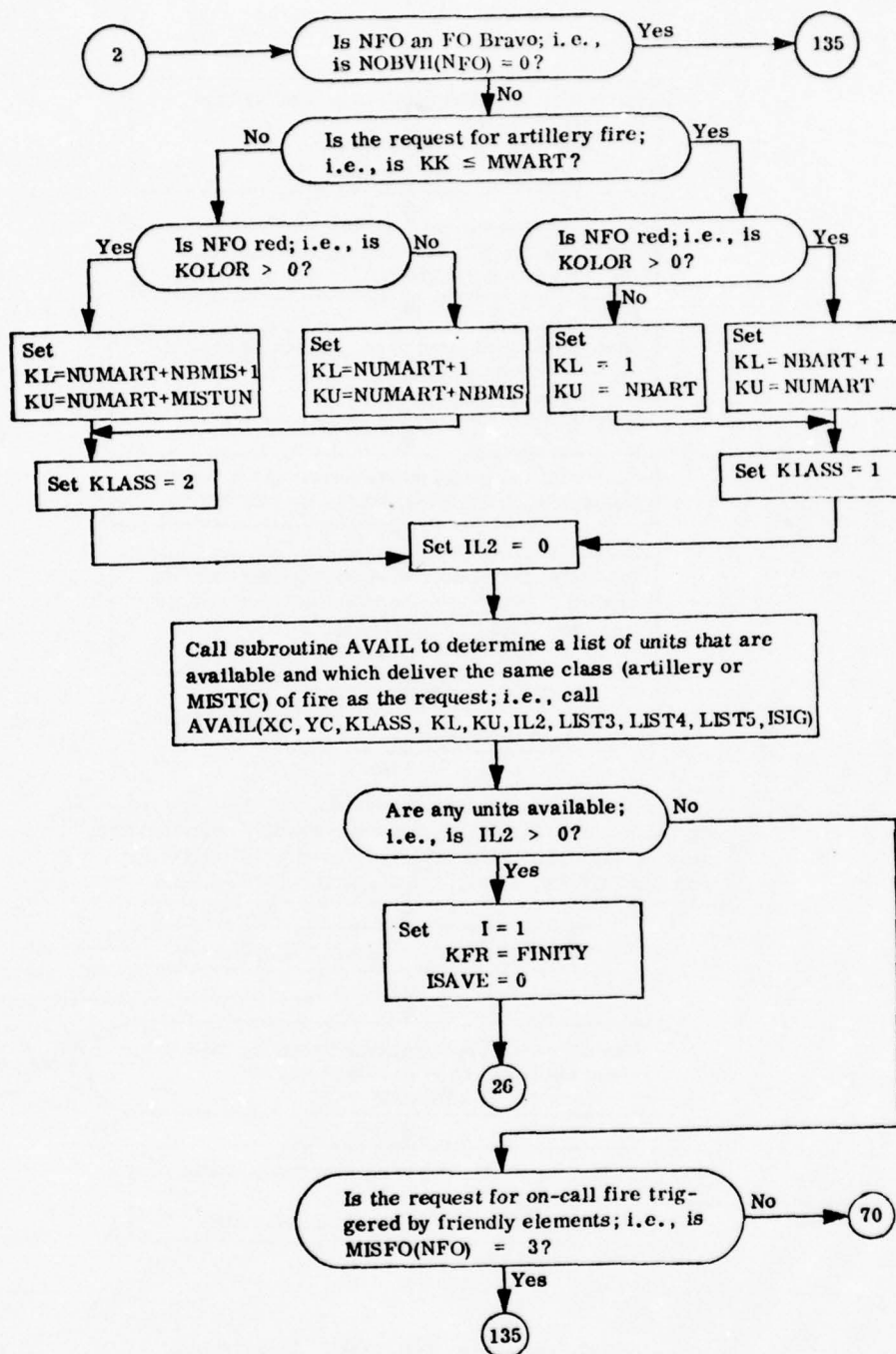
| | |
|---------|--------|
| AIRSEL | FSCVAL |
| AVAIL | REVAL |
| CNFLICT | |



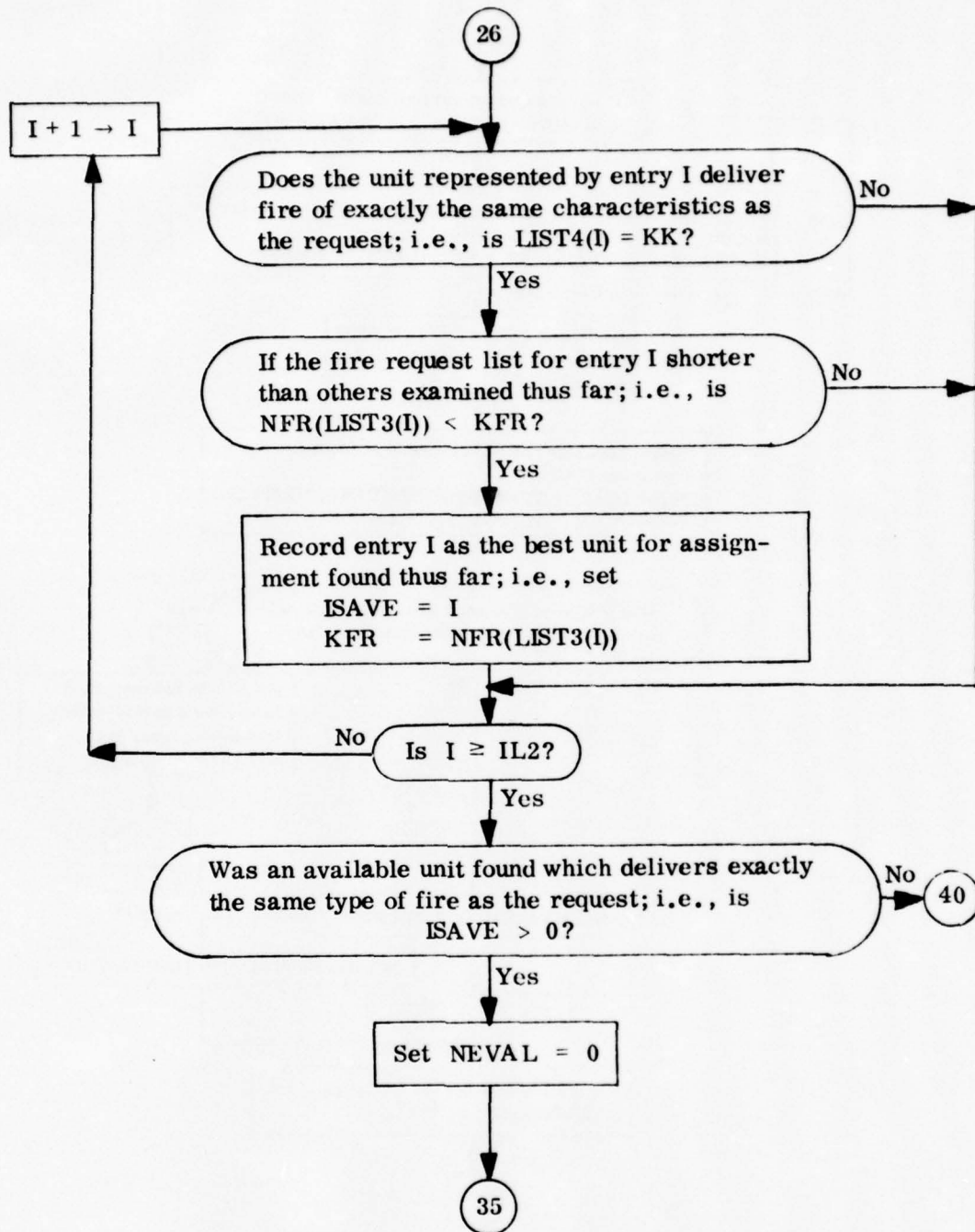
Subroutine FSCMON: Monitoring FO Messages



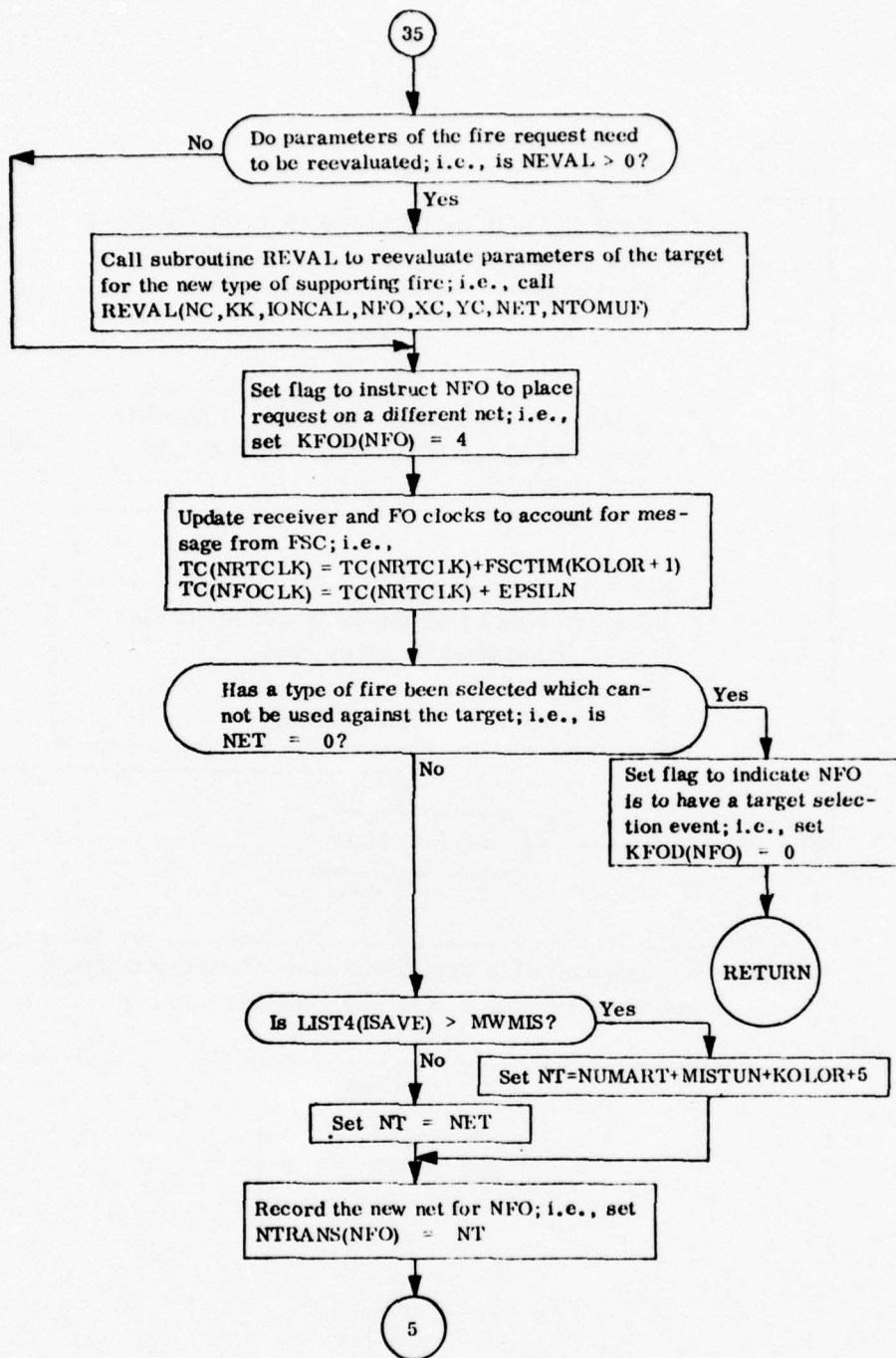
Subroutine FSCMON: Continued



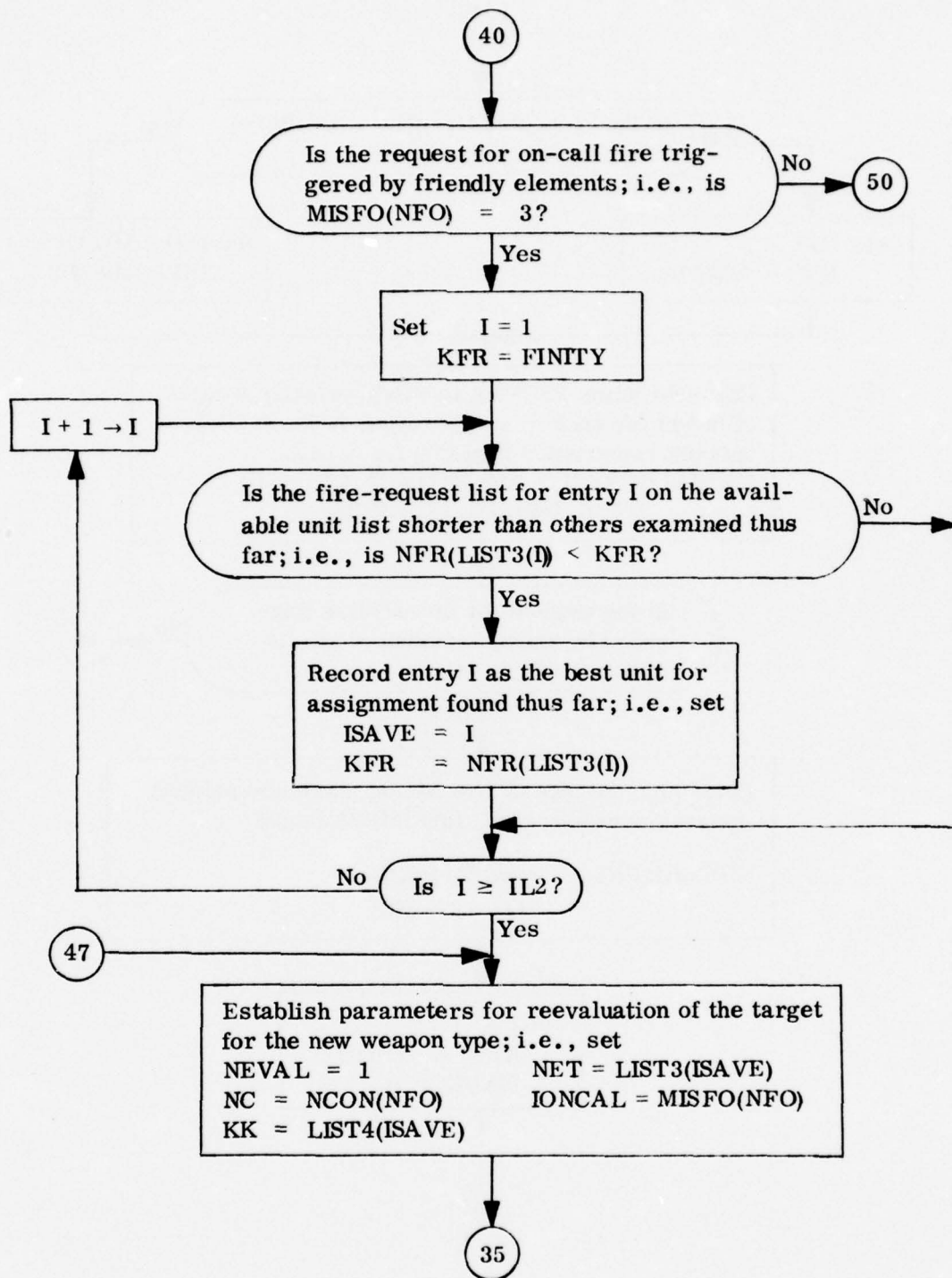
Subroutine FSCMON: Continued



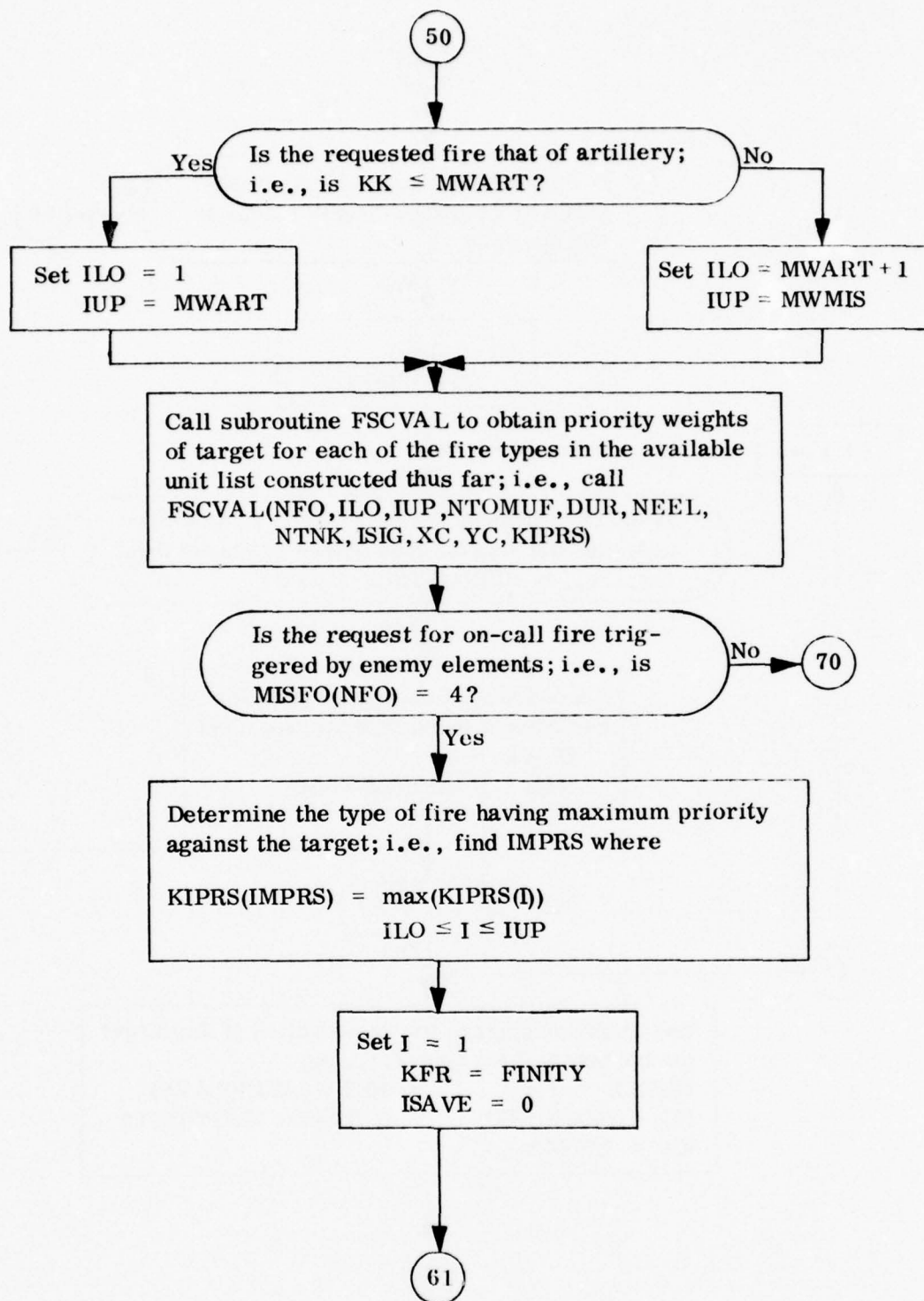
Subroutine FSCMON: Continued



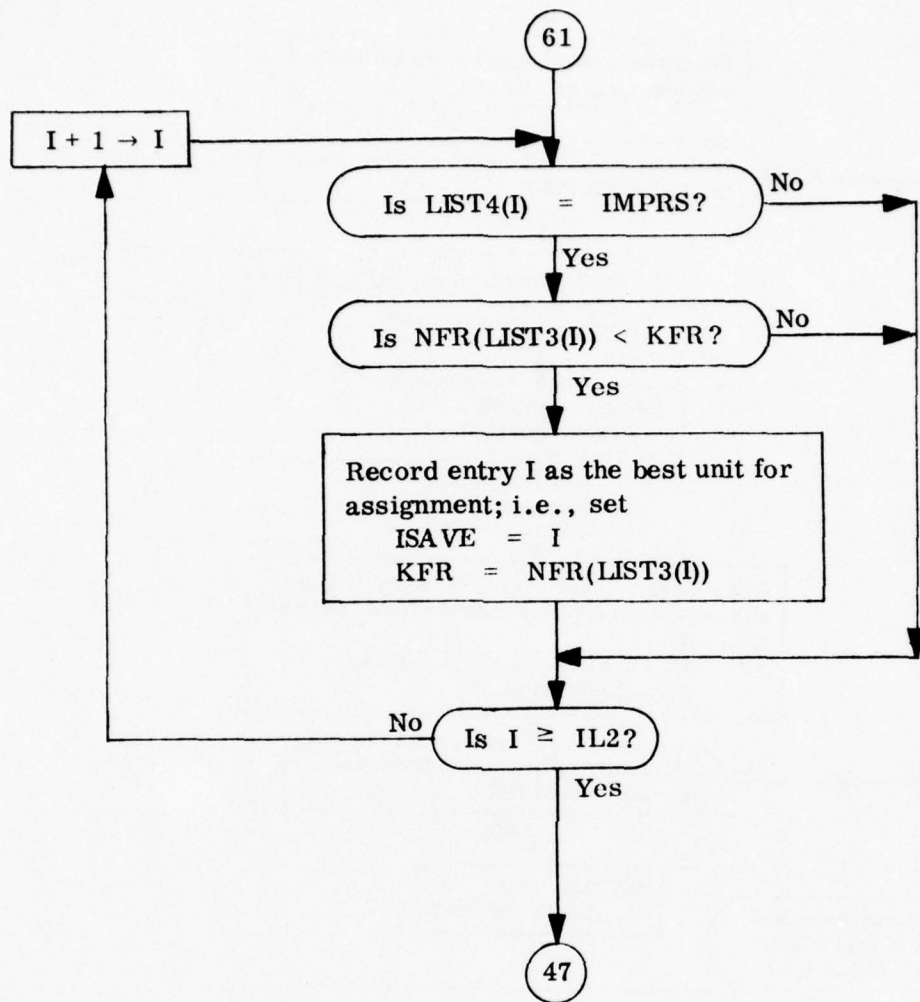
Subroutine FSCMON: Continued



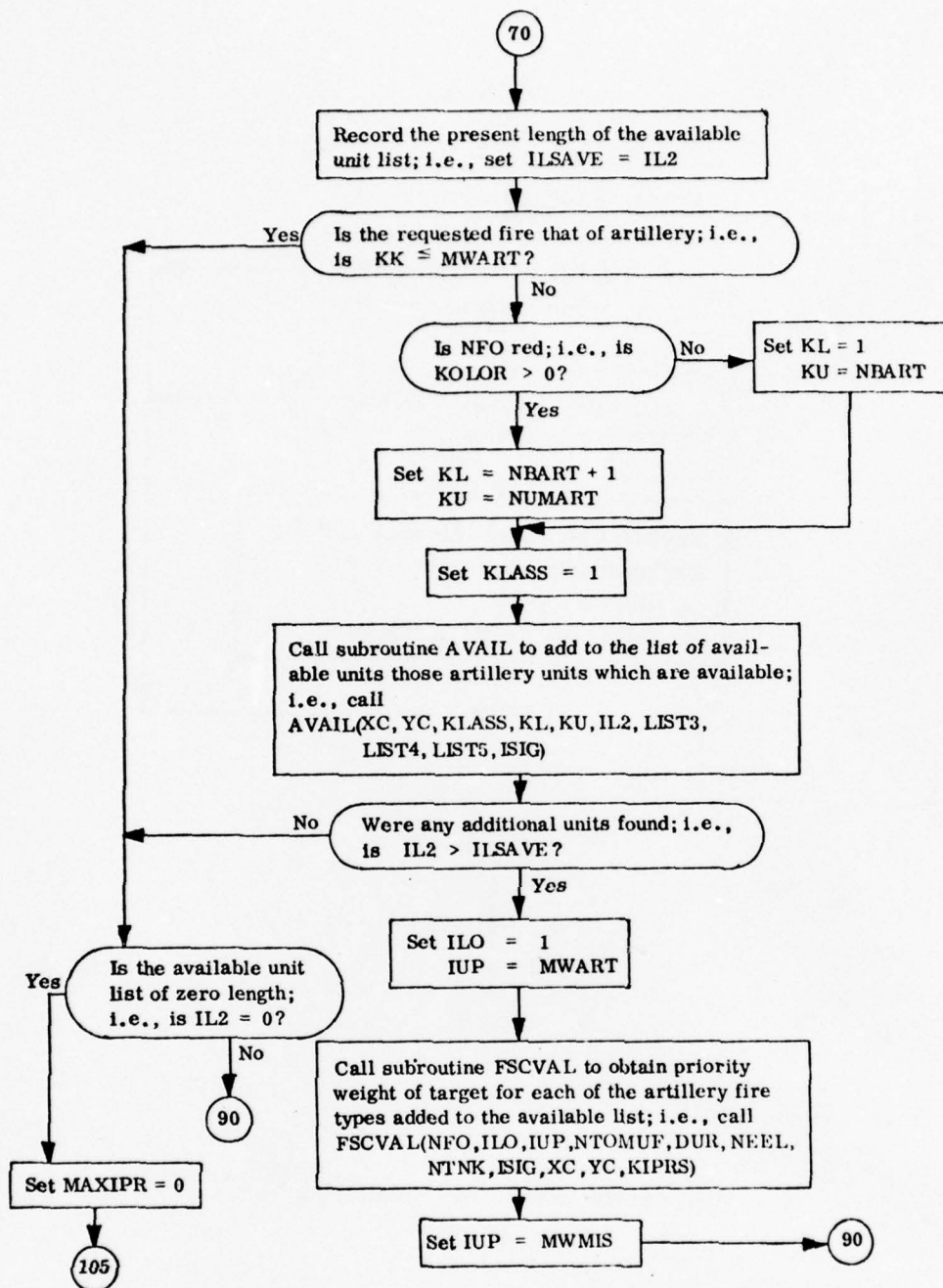
Subroutine FSCMON: Continued



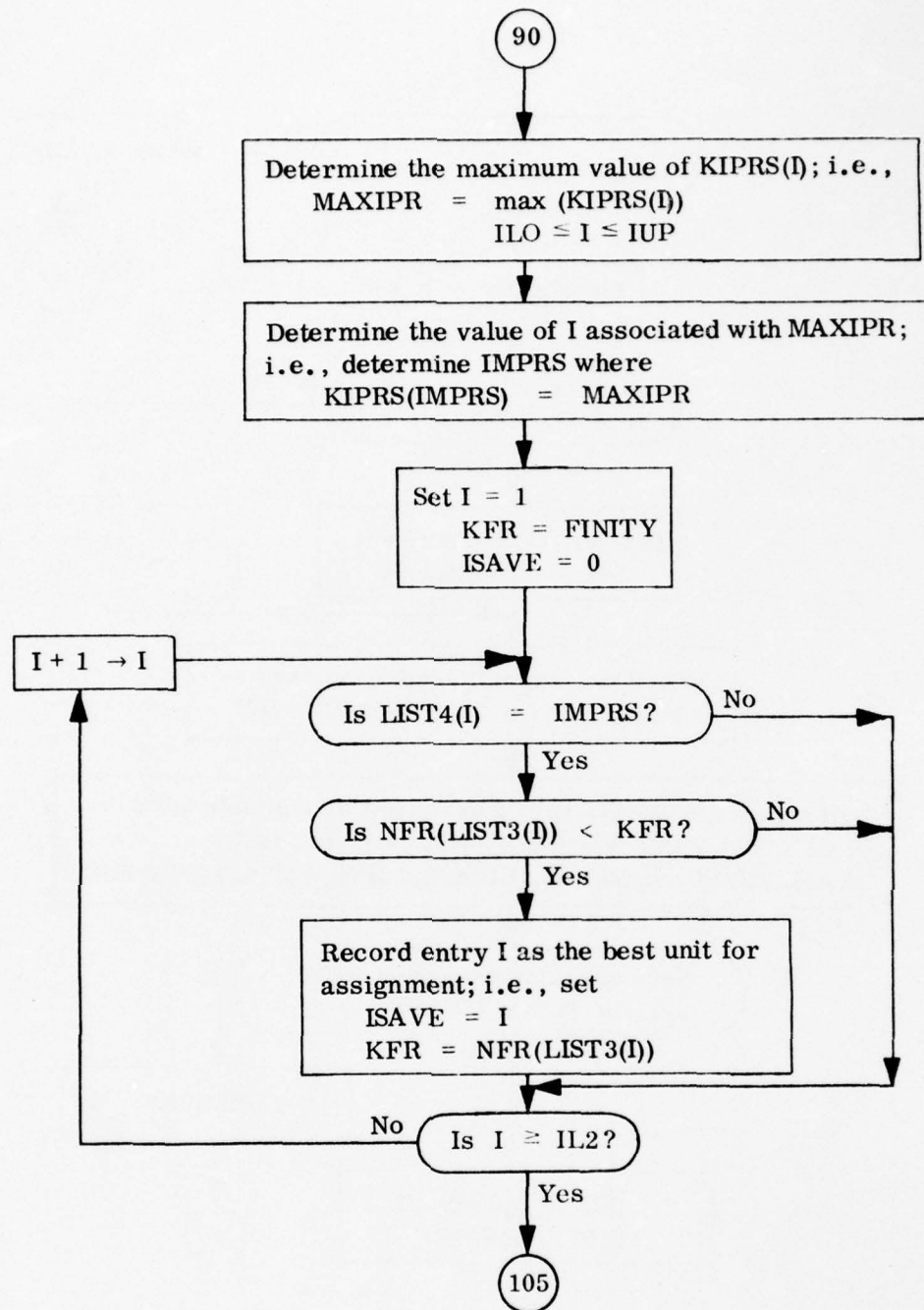
Subroutine FSCMON: Continued



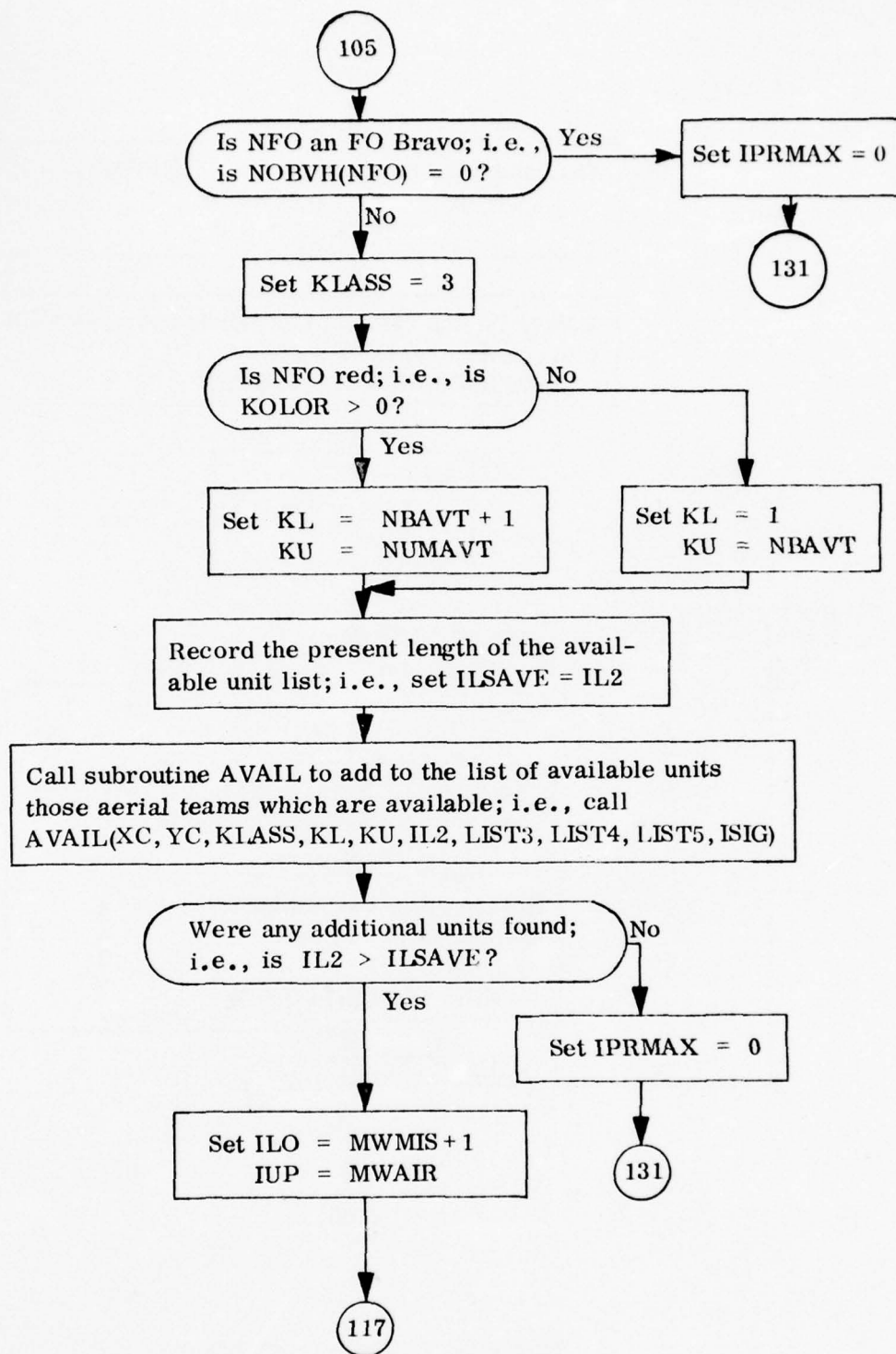
Subroutine FSCMON: Continued



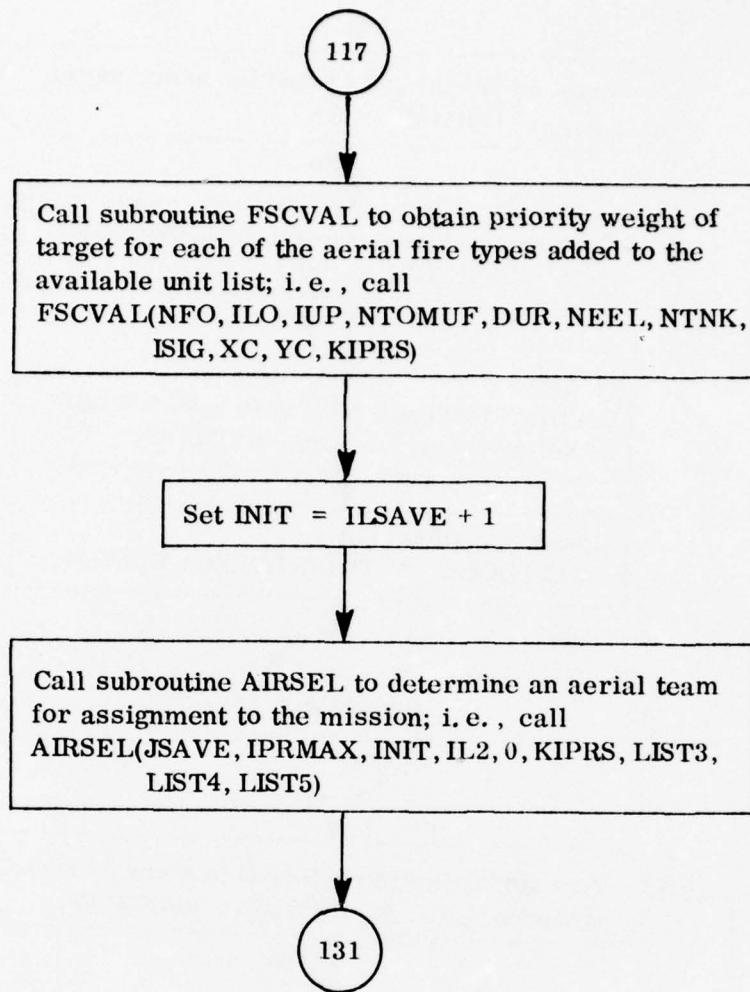
Subroutine FSCMON: Continued



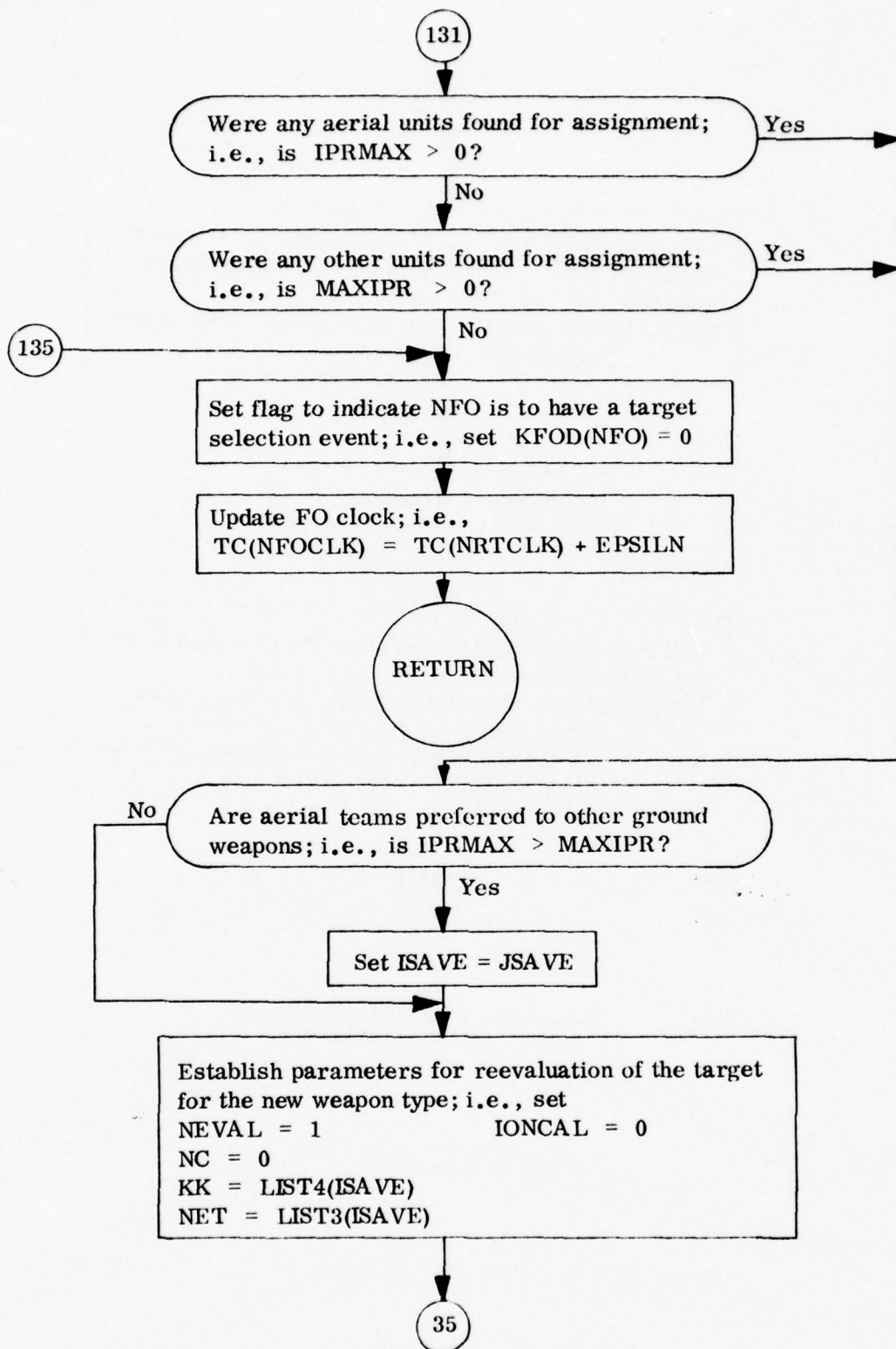
Subroutine FSCMON: Continued



Subroutine FSCMON: Continued

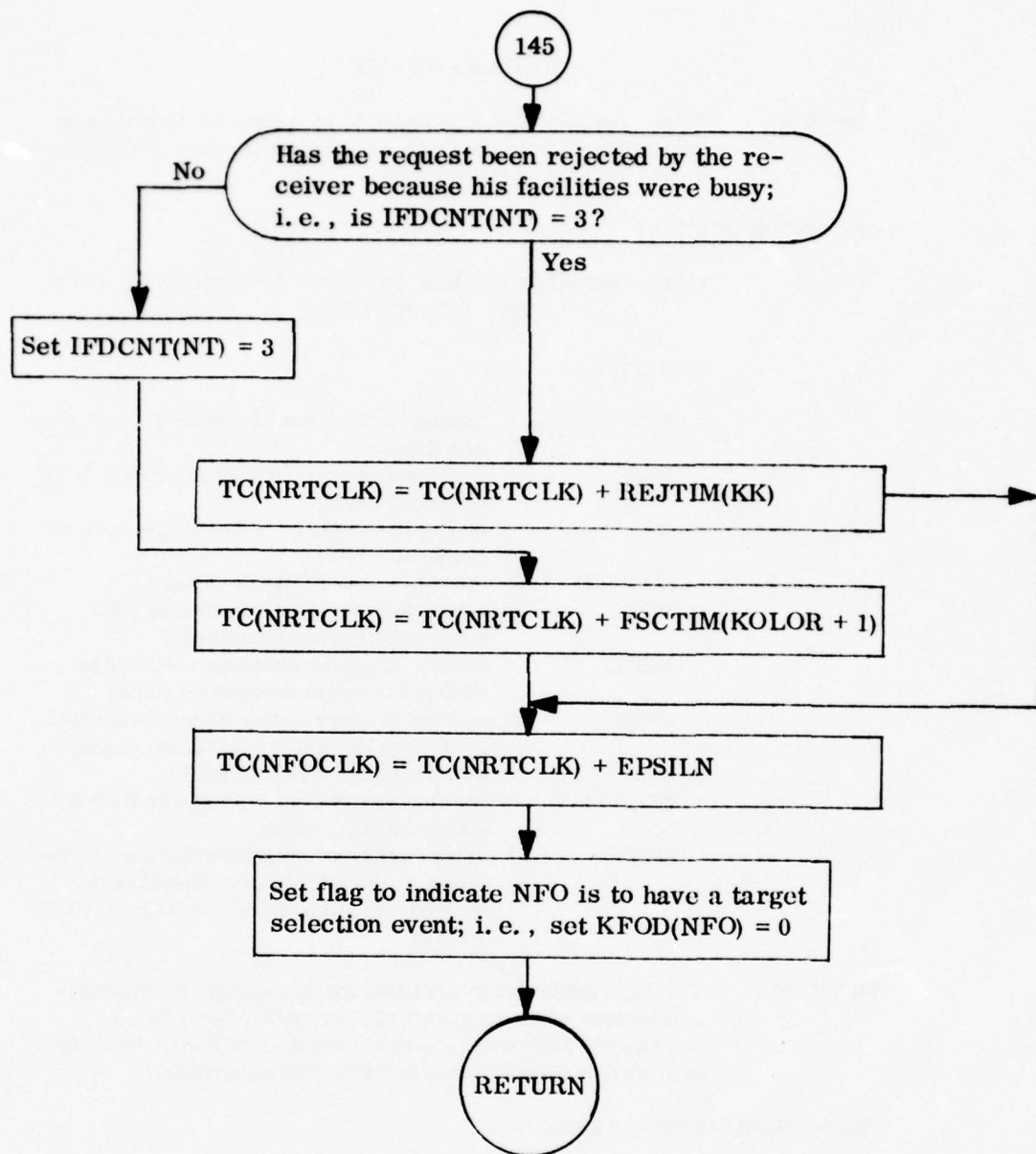


Subroutine FSCMON: Continued



Subroutine FSCMON: Continued

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Subroutine FSCMON: Continued

Subroutine FSCVAL

PURPOSE: Subroutine FSCVAL is designed to represent the fire-support coordinator's evaluation of a fire request for each of the fire support weapon codes available.

CALLING SEQUENCE:

CALL FSCVAL (NFO, ILO, IUP, NTOMUF, DUR, NEEL, NTNK,
ISIG, XC, YC, KIPRS)

where

| | |
|--------|---|
| NFO | = number of the forward observer requesting fire (input) |
| ILO | = first weapon code for which target is to be evaluated (input) |
| IUP | = last weapon code for which target is to be evaluated (input) |
| NTOMUF | = see subroutine FSCMON (input) |
| DUR | = target duration time reported by NFO in his target description (input) |
| NEEL | = number of enemy elements reported by NFO in his target description (input) |
| NTNK | = number of heavy enemy weapons reported by NFO in his target description (input) |
| ISIG | = see subroutine AVAIL (input) |
| XC, YC | = position coordinates reported by NFO in his target description |
| KIPRS | = array containing priorities assigned to the target by the fire-support coordinator for each type of fire ILO, ILO+1, ..., IUP (output). |

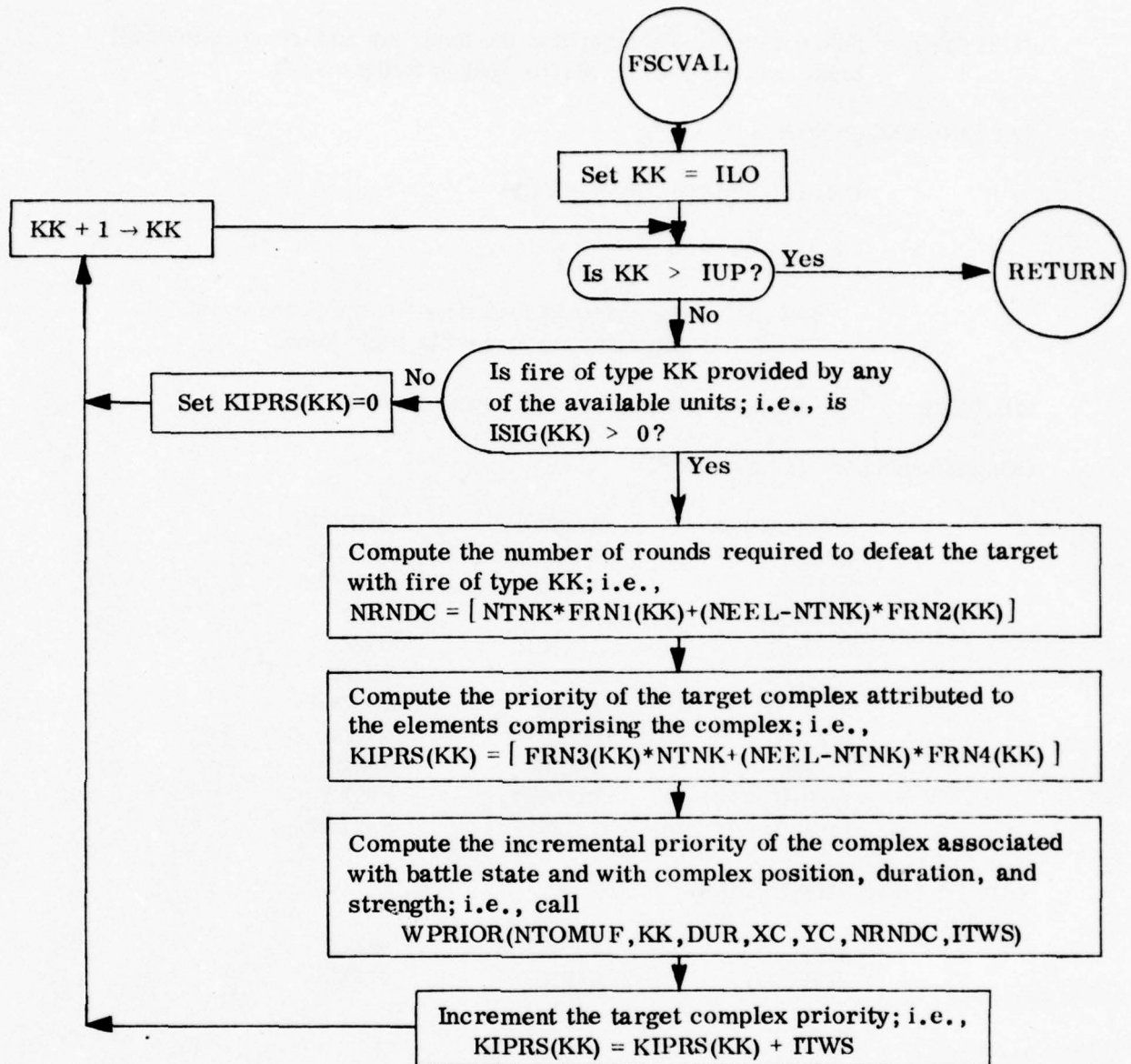
METHOD: The reported target is evaluated for engagement by fire-support weapon codes ILO, ILO+1, ..., IUP. The returned priority KIPRS(I) will be zero if weapon code I is unavailable or if weapon code I is unsuitable for the engagement.

COMMON AREAS REFERENCED:

| | |
|------|--------|
| FRN1 | FRN4 |
| FRN2 | NUMBER |
| FRN3 | |

SUBROUTINES REQUIRED:

WPRIOR



Subroutine FSCVAL: FSC Target Evaluation

Subroutine FTIME

PURPOSE: Subroutine FTIME computes the load, lay and firing time of all tank main gun and rapid fire weapon firing events.

CALLING SEQUENCE:

CALL FTIME(TLOAD, TFLY)

where

TLOAD = the returned load time for the firing event

TFLY = the returned projectile flight time.

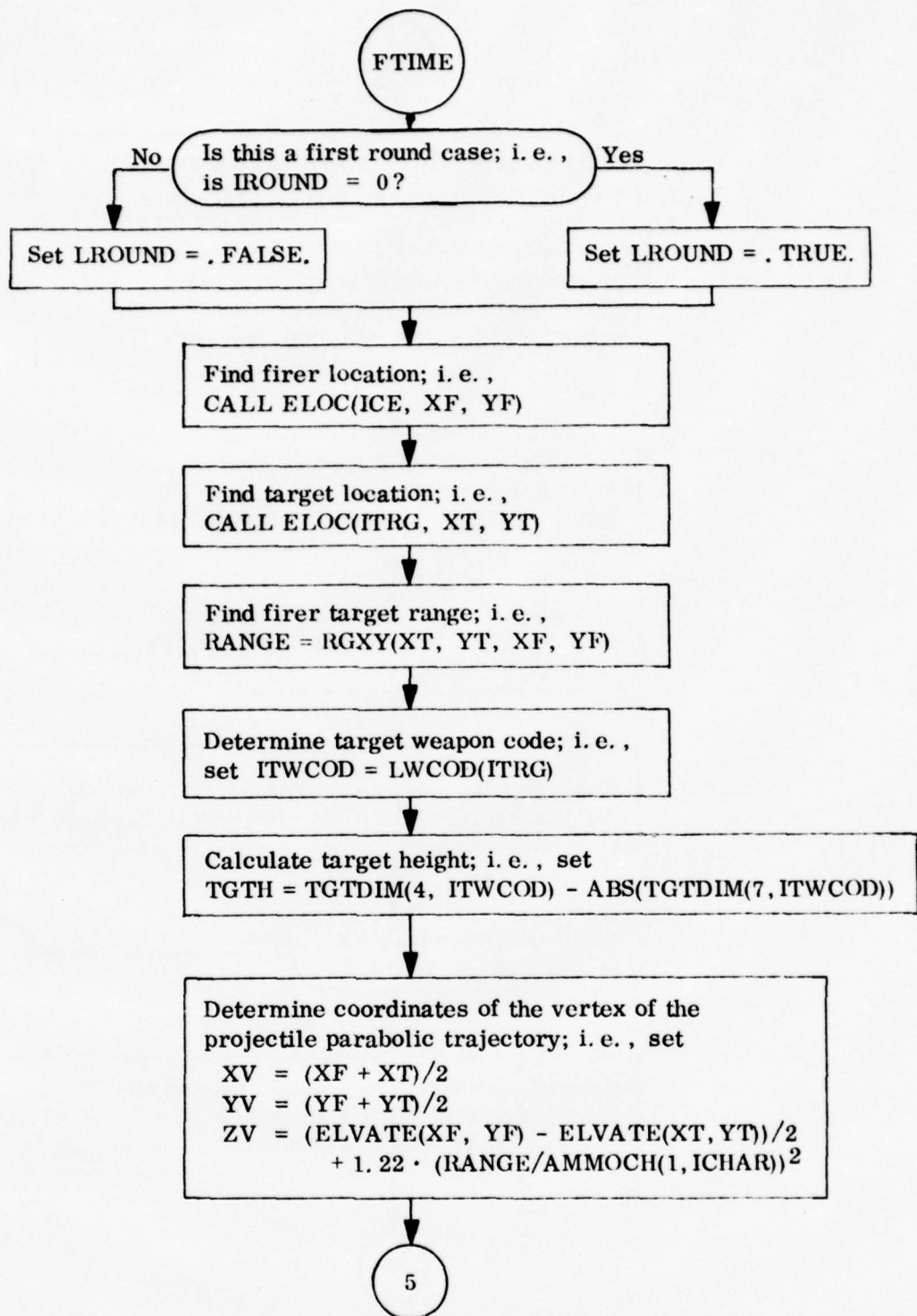
METHOD: The method is described in Chapter 9 of Volume 1.

COMMON AREAS REFERENCED:

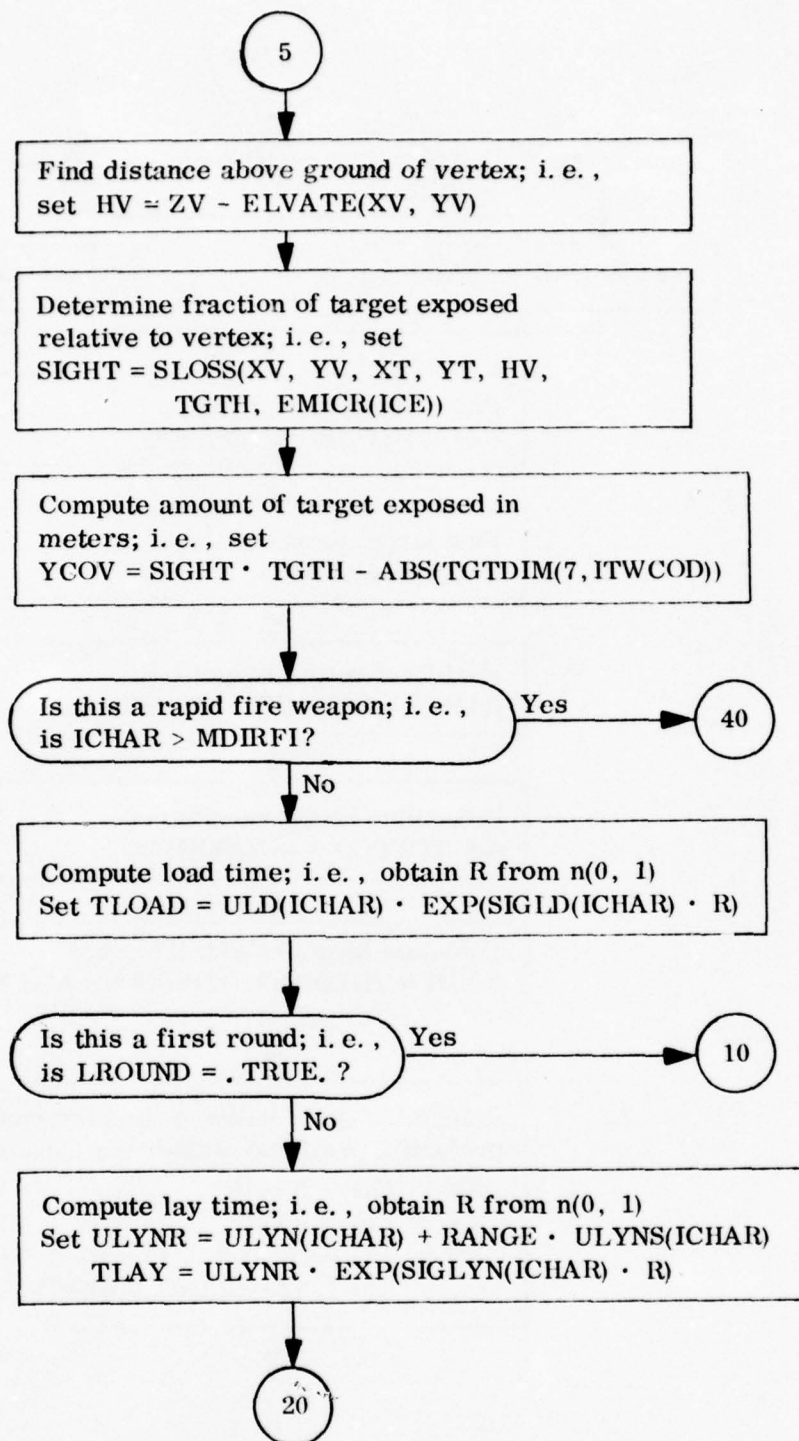
| | | |
|--------|--------|--------|
| AMMOCH | MAXWEP | TSDXMS |
| EFTM | MOVPAR | TSDYM |
| EMICR | PMISF | TSDYMS |
| FIRKON | RANGE | ULD |
| HPRNG | RPSIGX | ULY |
| IAMMO | RPSIGY | ULYN |
| ICECOM | TCOV | ULYNS |
| IFRNH | TGTDIM | ULYS |
| LDFR | TMISF | SIGLD |
| LPHIT | TMPRD | SIGLY |
| LWCOD | TSDXM | SIGLYN |

SUBROUTINES REQUIRED:

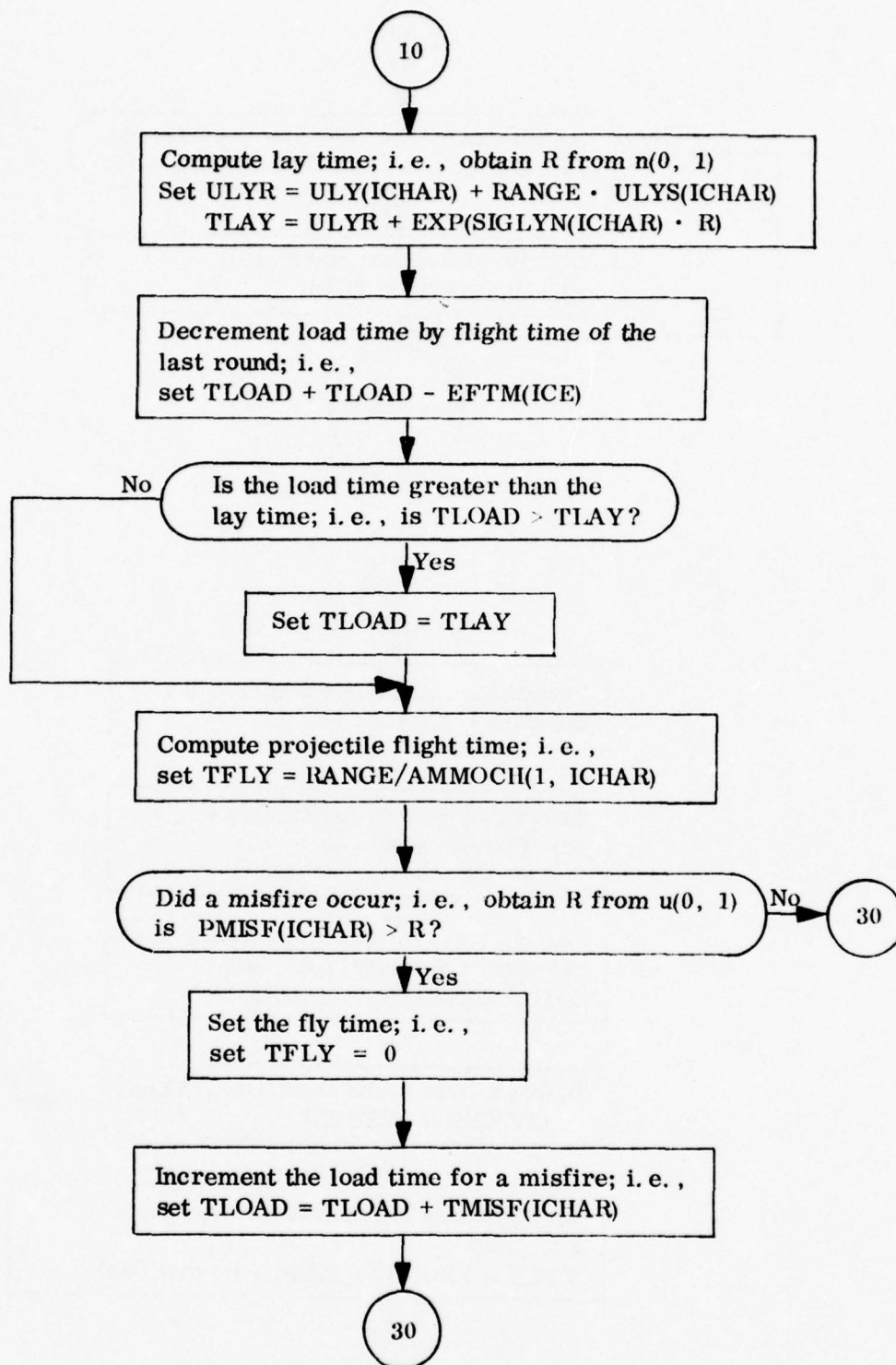
| | | |
|--------|--------|-------|
| AMMODR | ELOC | RGXY |
| DDSX | HIPROB | SLOSS |



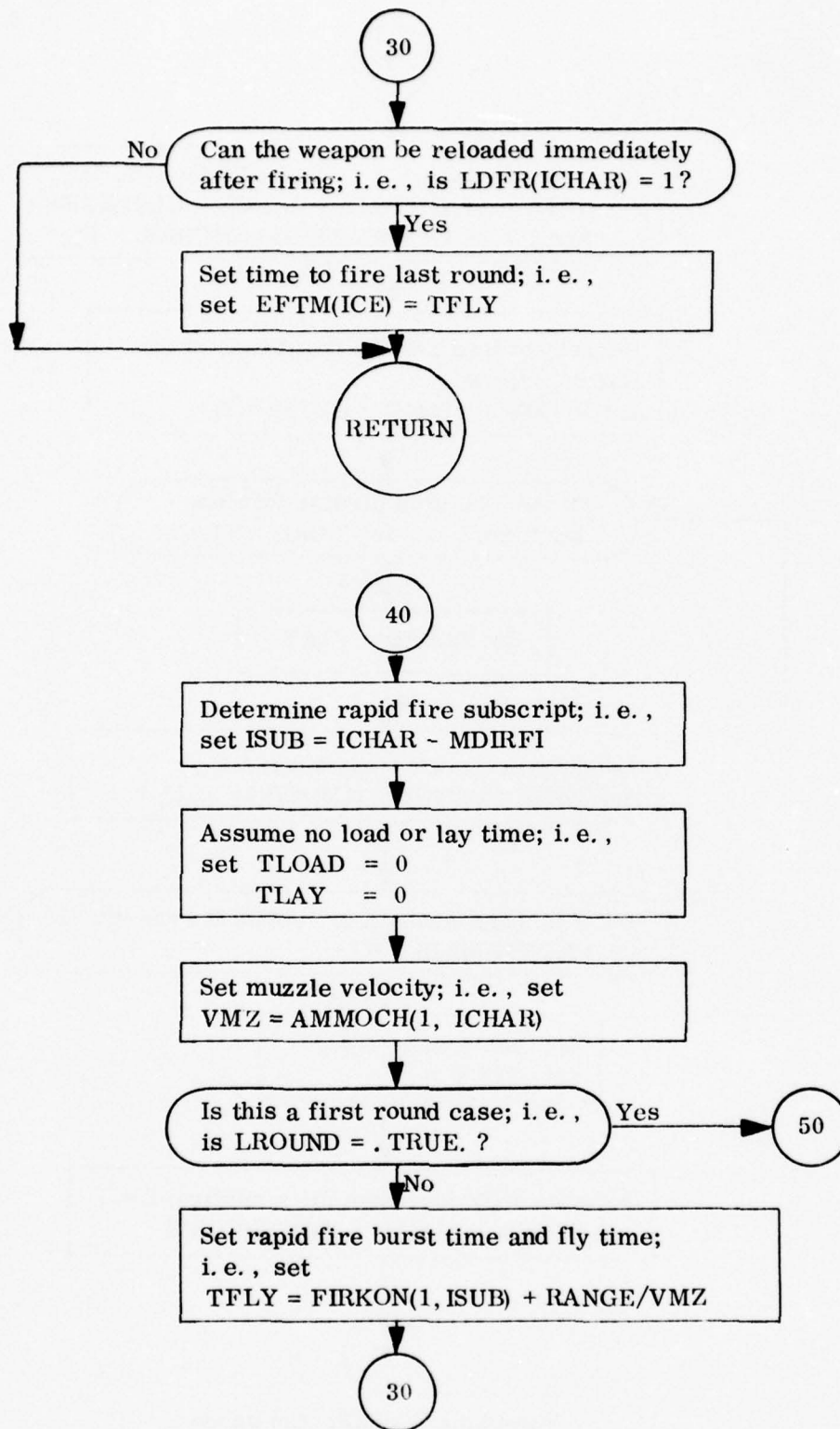
Subroutine FTIME: Firing Event Timing



Subroutine FTIME: Continued



Subroutine FTIME: Continued



Subroutine FTIME: Continued

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Determine horizontal and vertical round to round ballistic dispersions; i. e. , set
 RTRX = FIRKON(3, ISUB)
 RTRY = FIRKON(4, ISUB)

Call DDSX to determine horizontal and vertical errors, SDXM and SDYM, due to round to round dispersions; i. e. ,
 CALL DDSX(RANGE, SDXM, HPRNG, TSDXM(1, ISUB), 6)
 CALL DDSX(RANGE, SDYM, HPRNG, TSDYM(1, ISUB), 6)

Call DDSX to determine first round horizontal and vertical dispersion, SDXT and SDYT; i. e. ,
 CALL DDSX(RANGE, SDXT, HPRNG, RPSIGX(1, ISUB), 6)
 CALL DDSX(RANGE, SDYT, HPRNG, RPSIBY(1, ISUB), 6)

Compute total horizontal and vertical dispersions; i. e. ,
 set $SDXT = \sqrt{SDXT^2 + SDXM^2 + RTRX^2}$
 $SDYT = \sqrt{SDYT^2 + SDYM^2 + RTRY^2}$

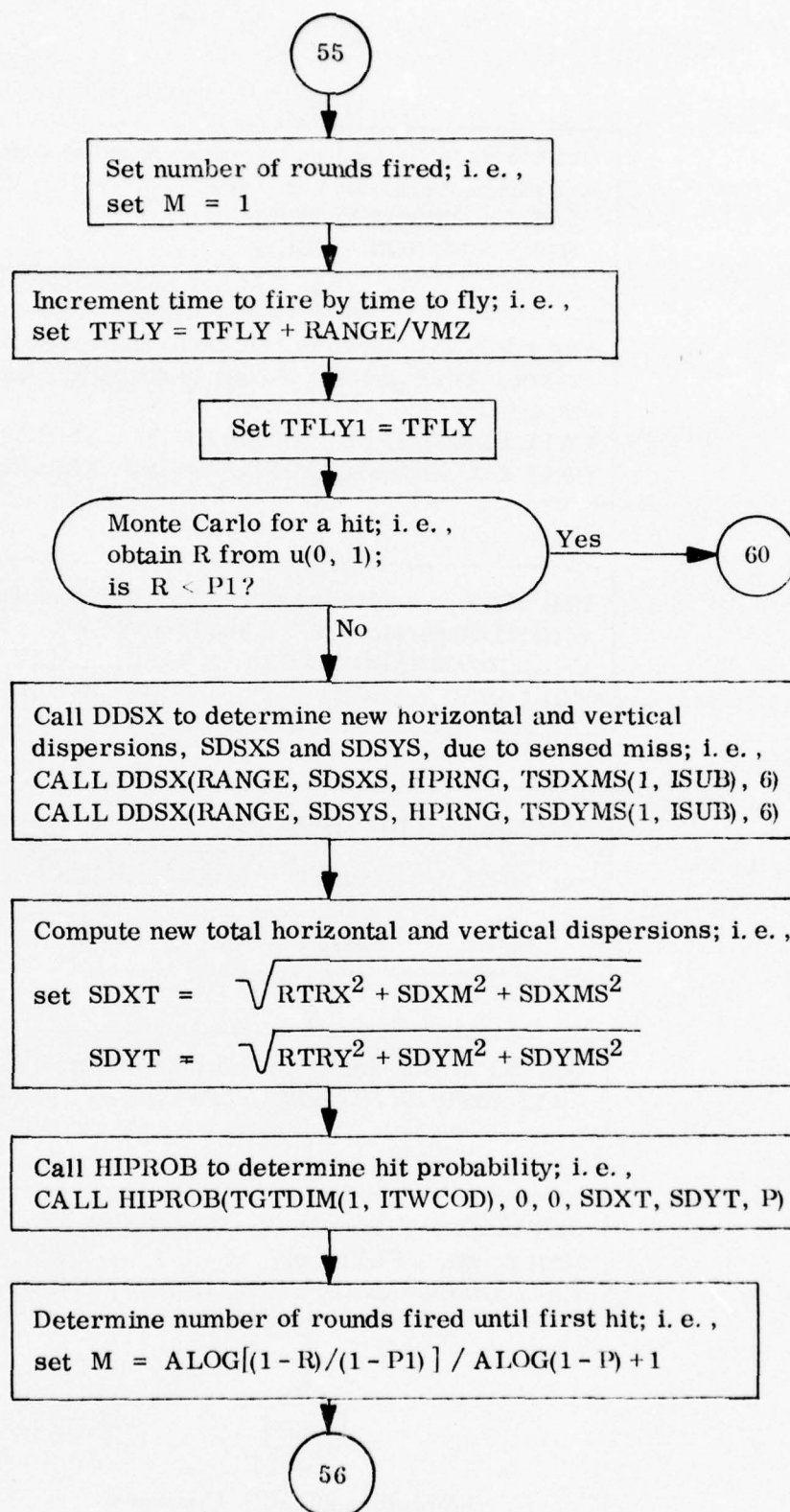
Call HIPROB to determine hit probability; i. e. ,
 CALL HIPROB(TGTDIM(1, ITWCOD), 0, 0, SDXT, SDYT, P1)

Call DDSX to determine the time to fire the first round, TFLY; i. e. ,
 CALL DDSX(RANGE, TFLY, HPRNG, TMPRD(1, 1 ISUB), 6)

55

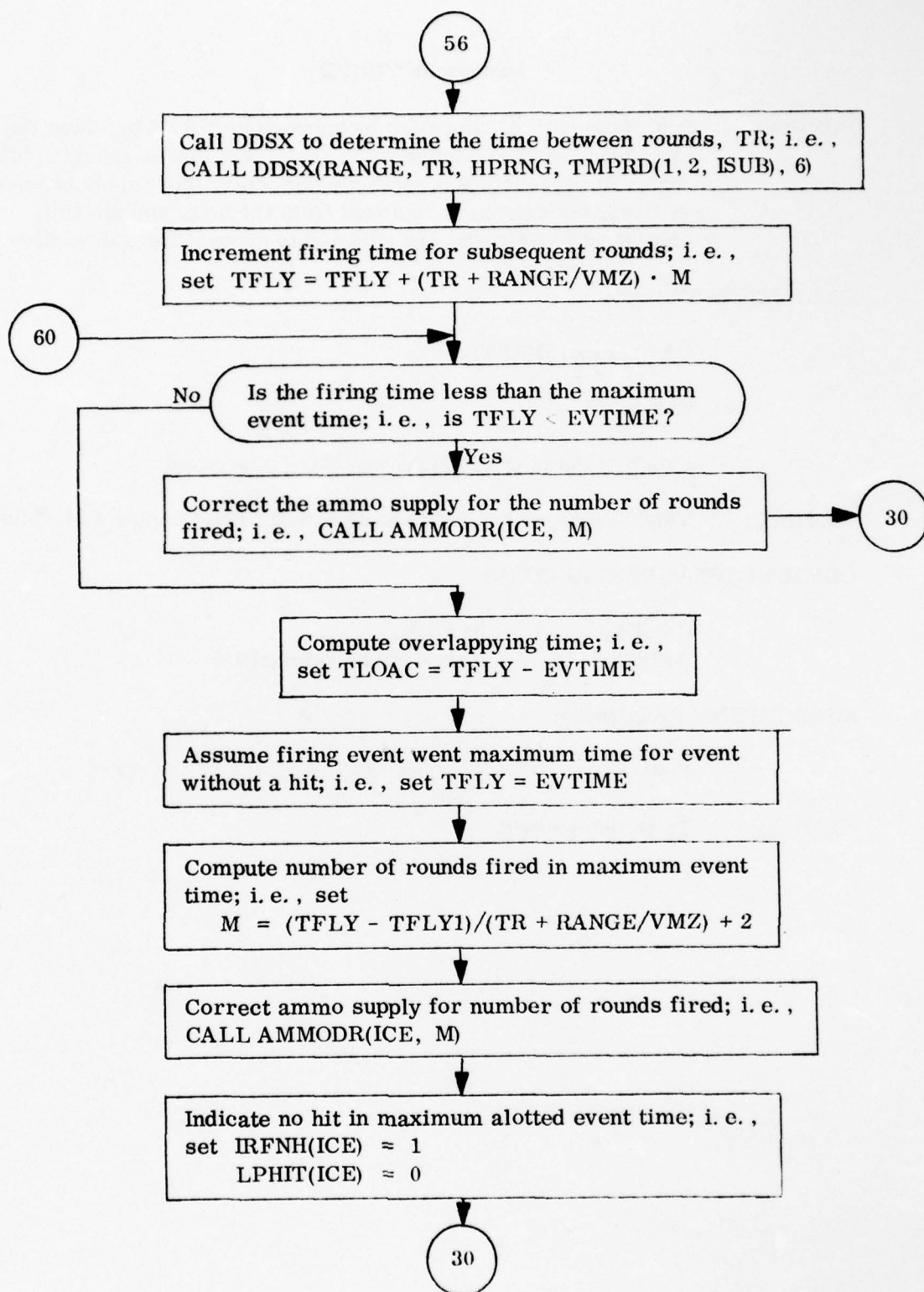
Subroutine FTIME: Continued

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Subroutine FTIME: Continued

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Subroutine FTIME: Continued

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Subroutine FUELD

PURPOSE: Subroutine FUELD is called by subroutine AIRFB to adjust the fuel supply of each section in an aerial unit that is loitering off the battlefield. When a section's remaining fuel supply becomes critical, the section is removed from the unit, and the unit organization variables are adjusted to account for the deletion.

CALLING SEQUENCE:

CALL FUELD(NAT)

where

NAT = number of aerial unit being processed

METHOD: This subroutine has not been designed. See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

CFUEL
RFUEL

WFUEL
Others to be determined

SUBROUTINES REQUIRED:

None

LENGTH: To be determined.

Subroutine GETDET

PURPOSE: Subroutine GETDET determines the knowledge possessed by a specified group of observers about each enemy element.

CALLING SEQUENCE:

CALL GETDET(LSTD,KDET)

where

LISTD = array containing observer element numbers

KDET = array containing knowledge about each enemy element possessed by observer elements in LISTD

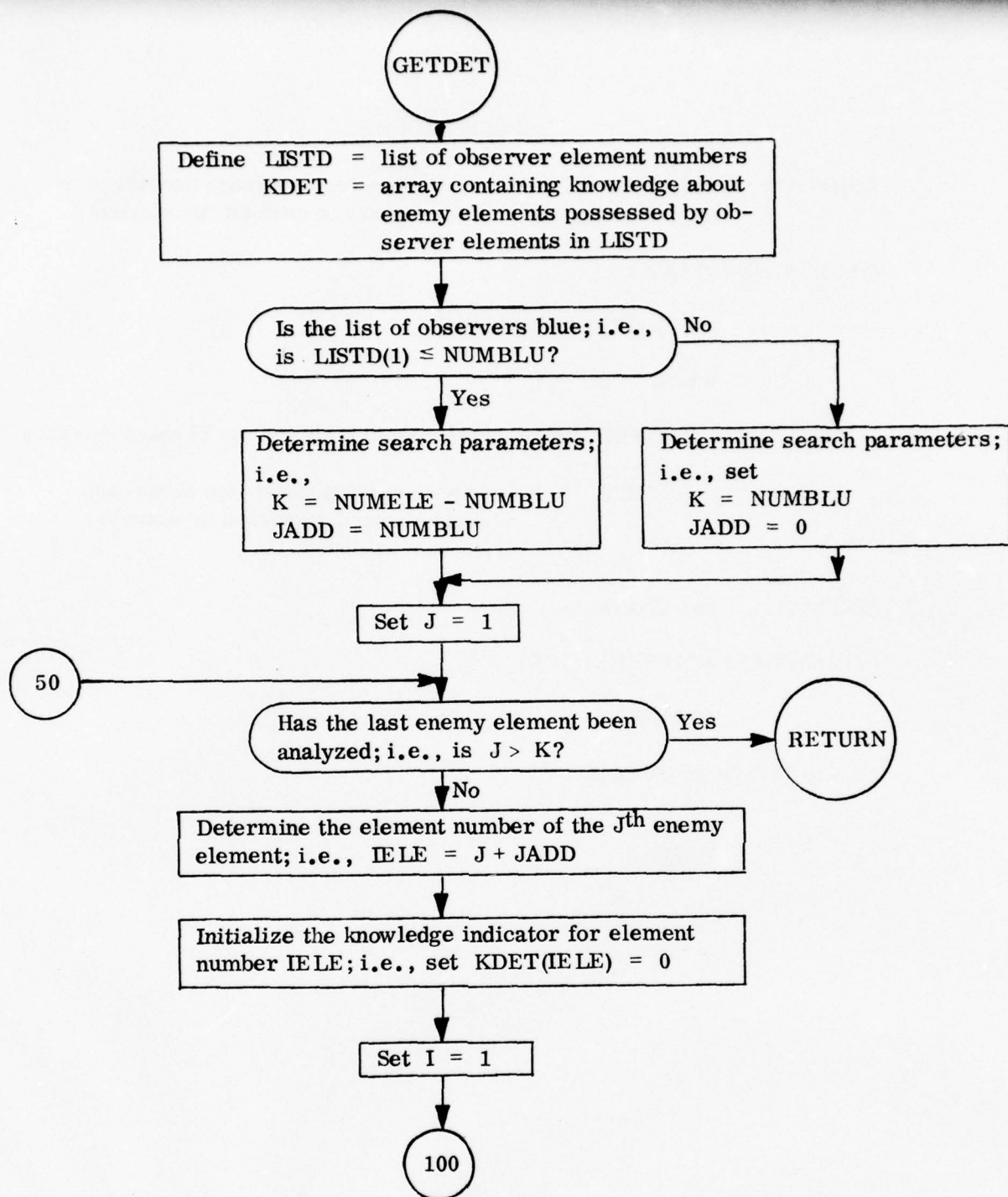
METHOD: See Chapter 6.

COMMON AREA REFERENCED:

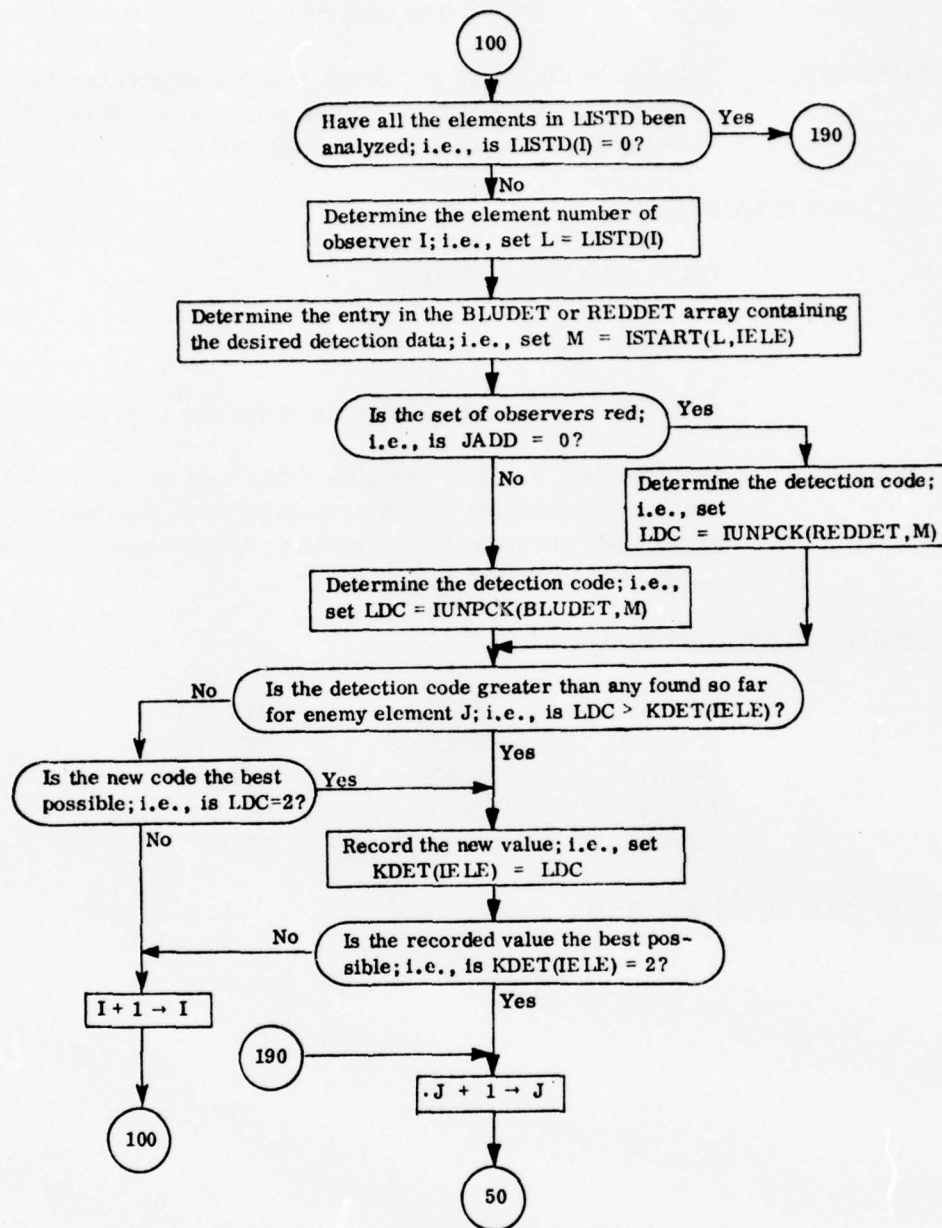
NUMBER

SUBROUTINES REQUIRED:

ISTART
IUNPCK



Subroutine GETDET: Assessing an Aerial Unit's Intelligence



Subroutine GETDET: Continued

Subroutine GETHEL

PURPOSE: Subroutine GETHEL performs processing required to determine if an aerial element has become a casualty. If so, the element is removed from its section organization.

CALLING SEQUENCE:

CALL GETHEL(TIME)

where

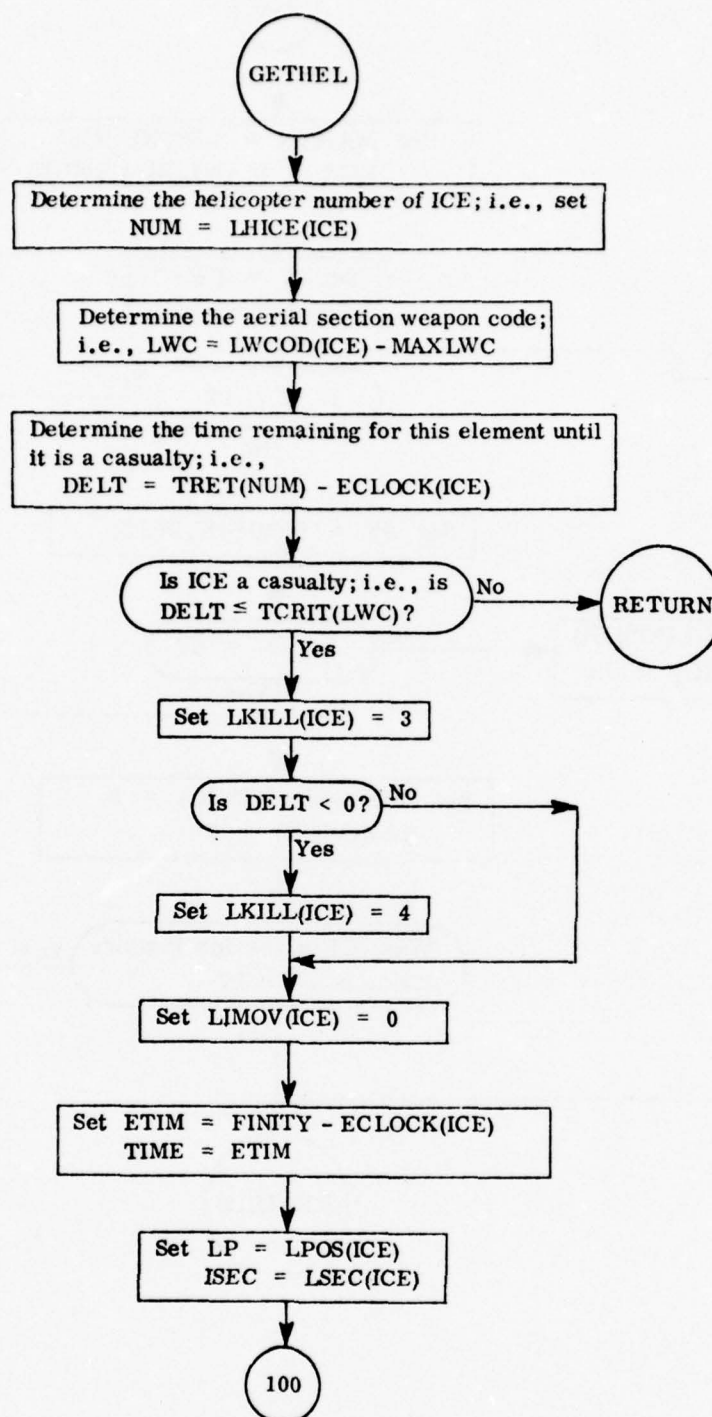
TIME = computed event time for the current element.

METHOD: See Chapter 9. The variable TIME will be returned as zero if the current element is not a casualty or if the current element is the sole survivor of its section. Otherwise, a large positive number is returned.

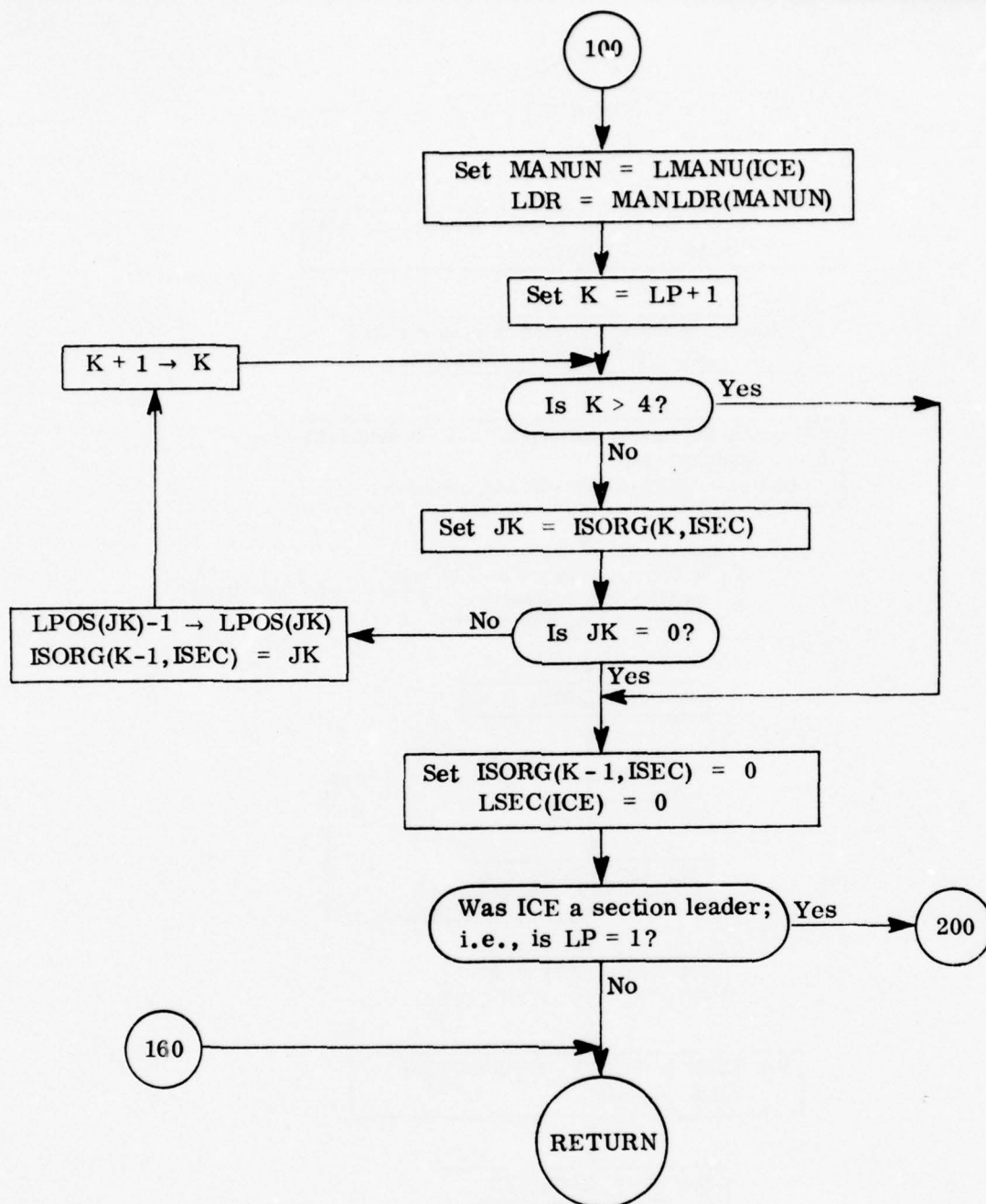
COMMON AREAS REFERENCED:

| | | |
|--------|-------|--------|
| ECLOCK | LKILL | MANLDR |
| ICECOM | LMANU | NUMBER |
| ISORG | LPOS | SETPAR |
| LHICE | LSEC | TCRIT |
| LIMOV | LWCOD | TRET |

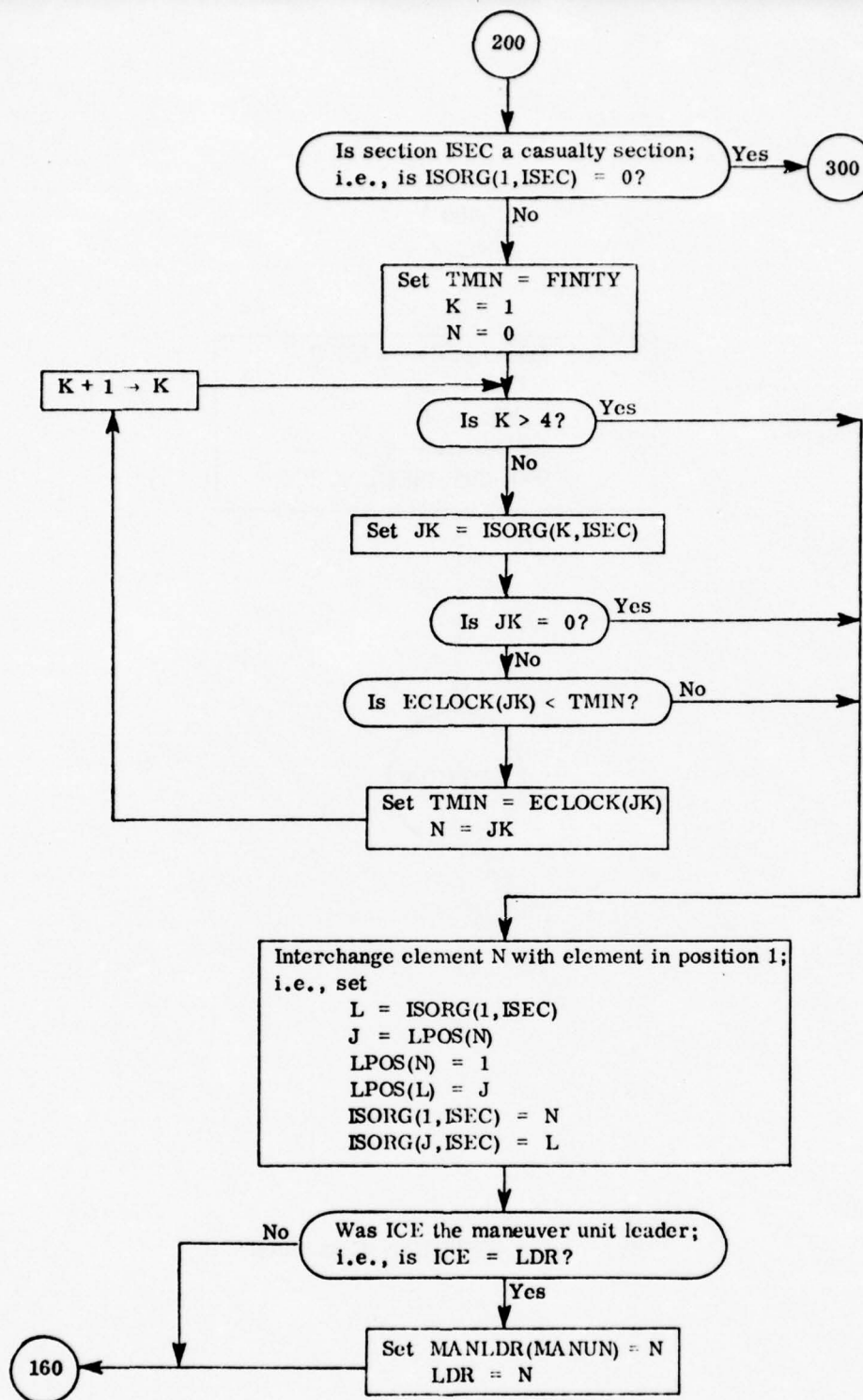
SUBROUTINES REQUIRED: None



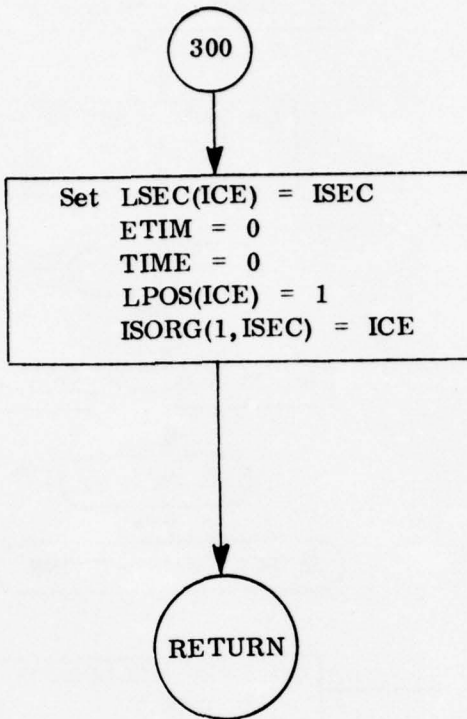
Subroutine GETHEL: Processing Aerial Vehicle Casualties



Subroutine GETHEL: Continued



Subroutine GETHEL: Continued



Subroutine GETHEL: Continued

Subroutine HDIF

PURPOSE: Subroutine HDIF computes the expected tactical difficulty of a route segment for an aerial vehicle unit.

CALLING SEQUENCE:

CALL HDIF(E)

where

E is a two-dimensional array specifying the tactical difficulty associated with each point in an aerial vehicle unit's route selection area. The dimensions of E are 20 * 8.

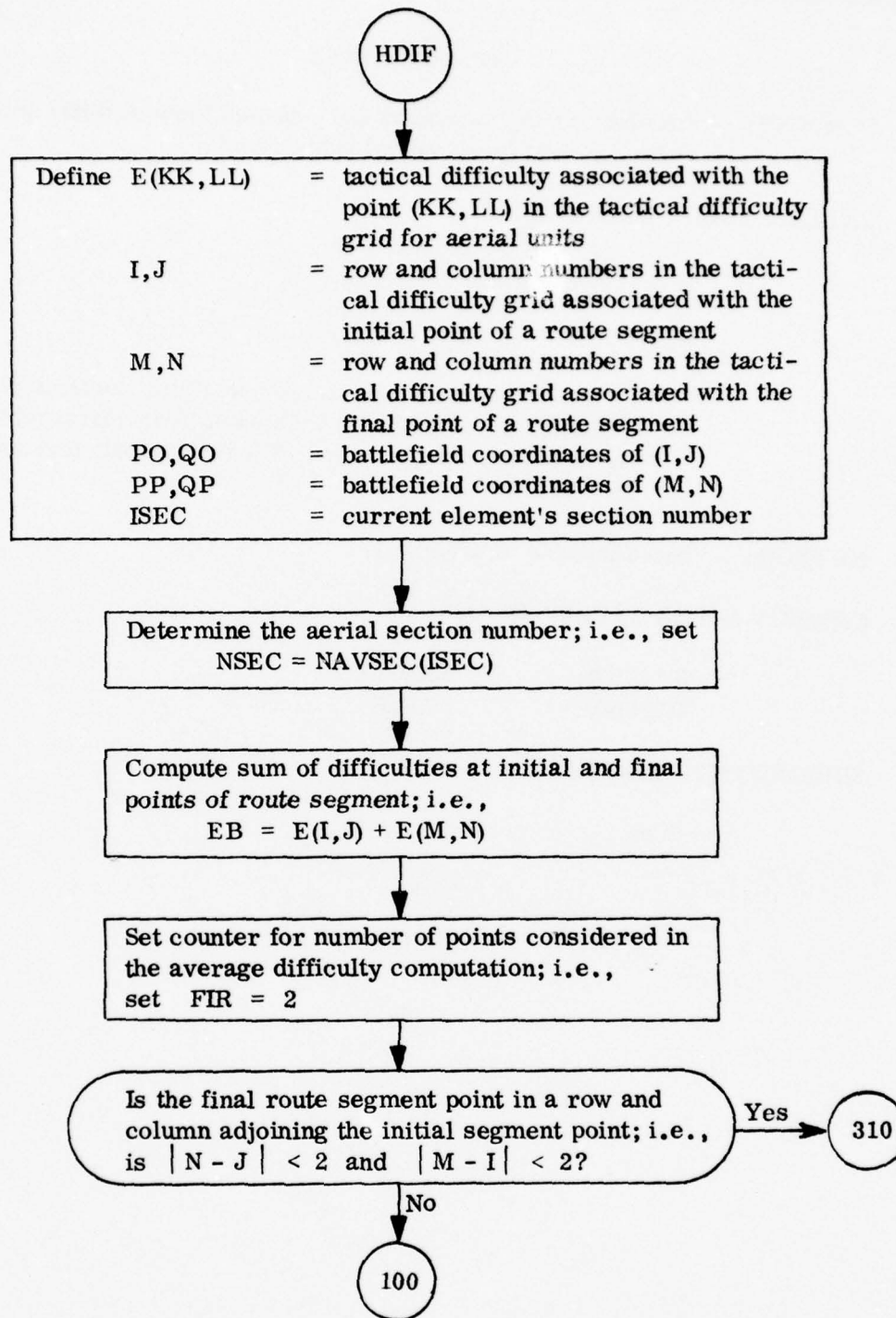
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

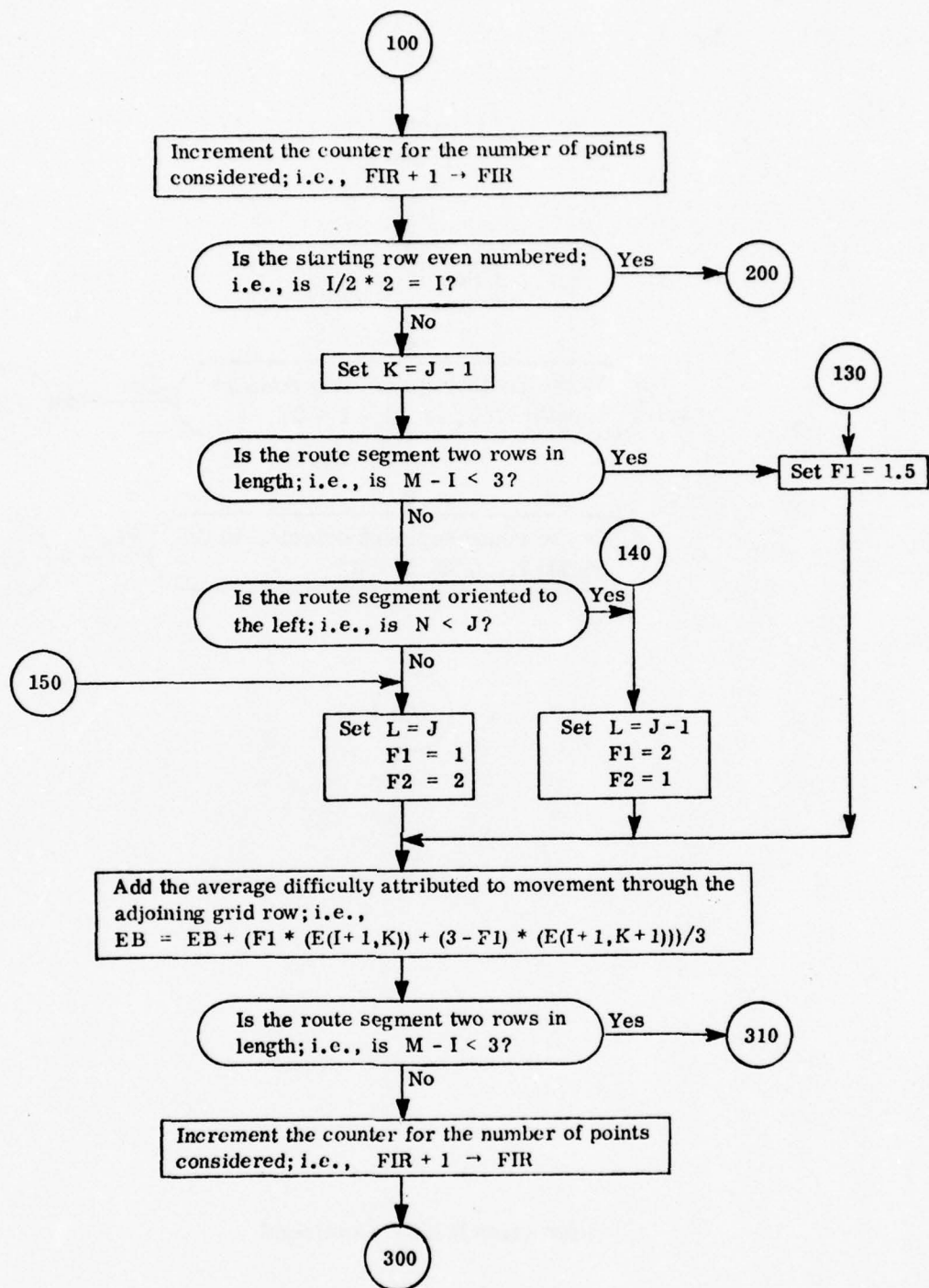
| | |
|--------|--------|
| TACKON | NAVSEC |
| ICECOM | SPDSE |

SUBROUTINES REQUIRED:

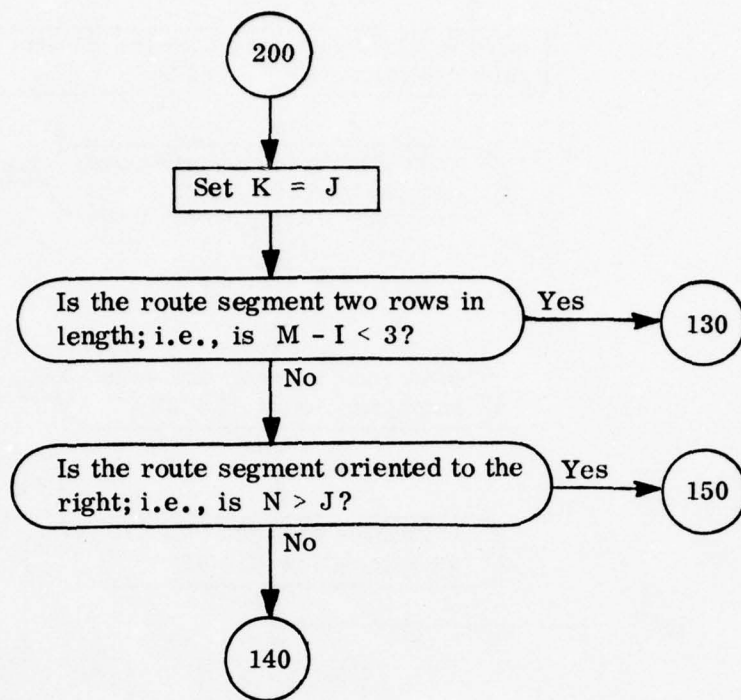
None



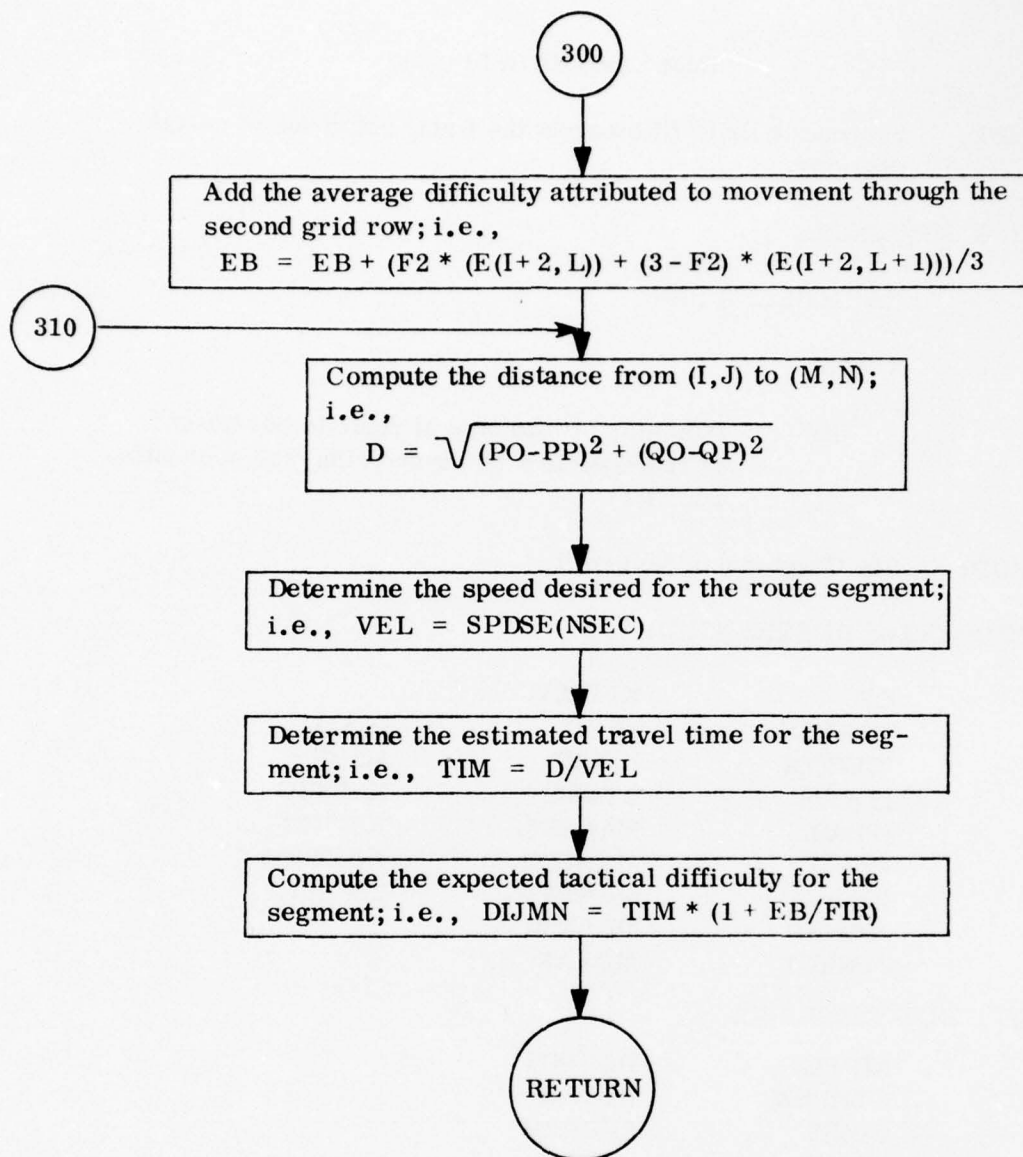
Subroutine HDIF: Tactical Difficulty for Aerial Vehicles



Subroutine HDIF: Continued



Subroutine HDIF: Continued



Subroutine HDIF: Continued

Subroutine HELFIR

PURPOSE: Subroutine HELFIR controls the firing activities of aerial sections.

CALLING SEQUENCE:

CALL HELFIR(IRS)

where

IRS = indicator for the type of route to be chosen
in response to a firing decision (see subroutine
PICKRT)

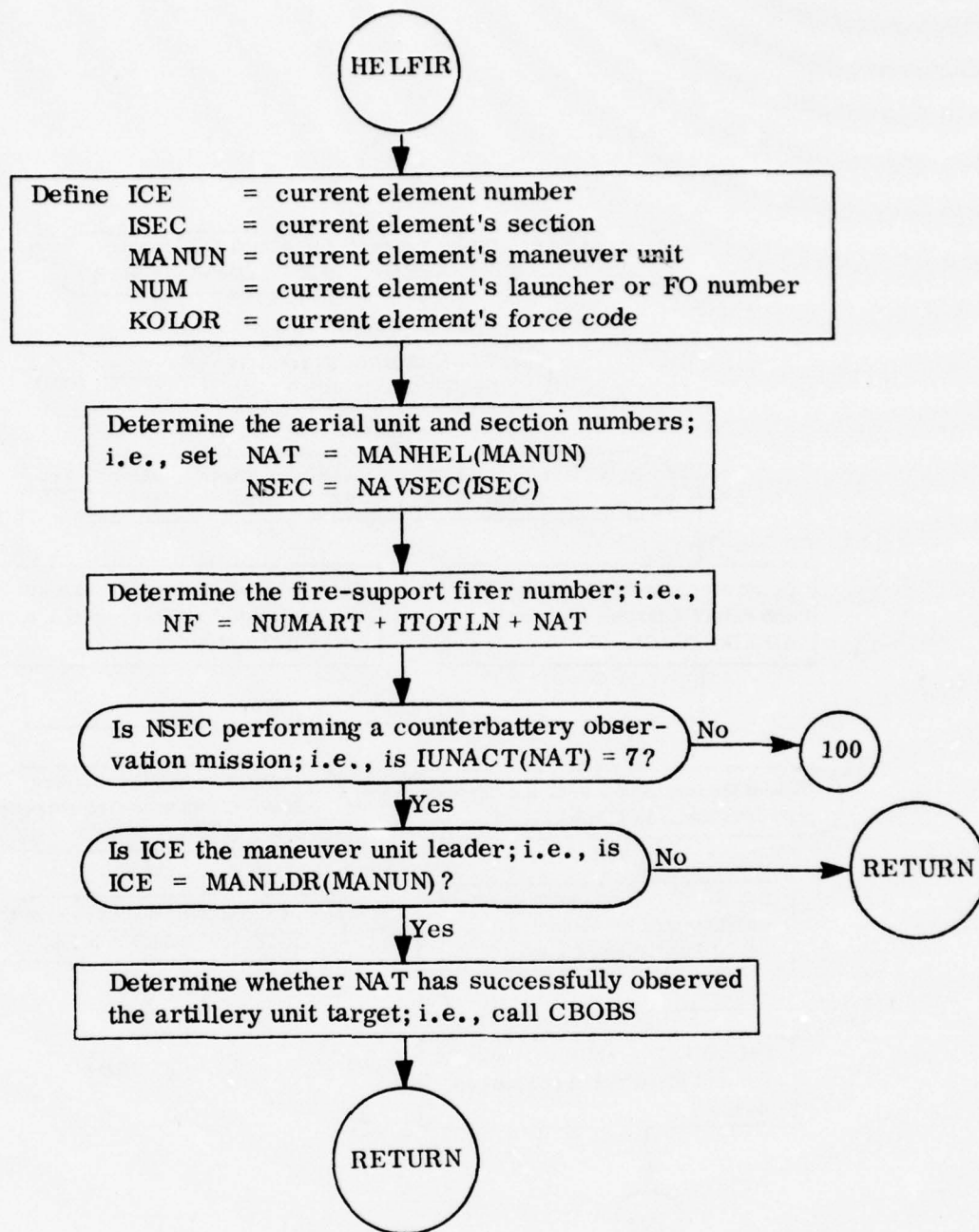
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

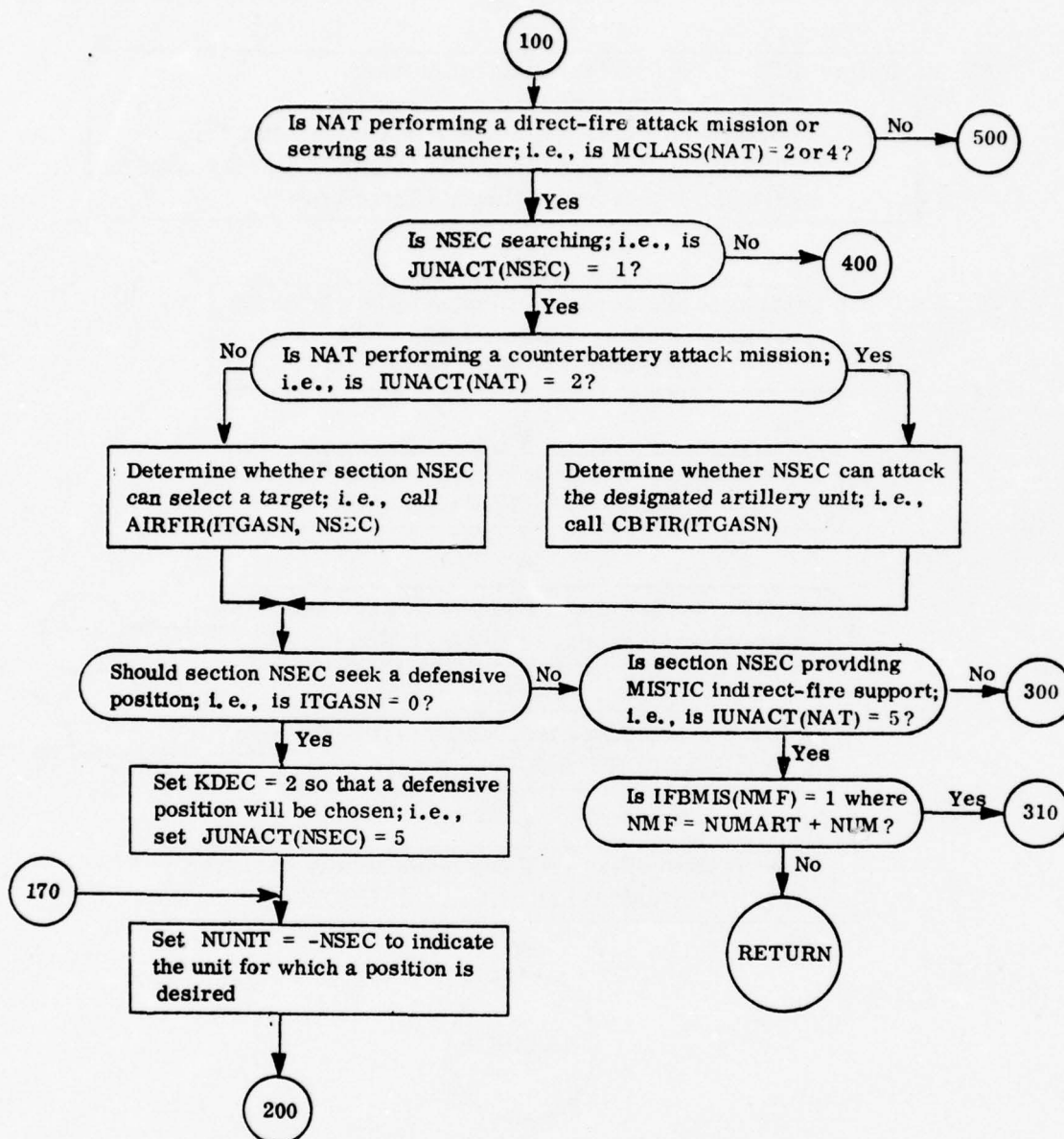
| | | |
|--------|--------|--------|
| CF | KFIREV | MISFO |
| FORMSE | KFOD | MSFP |
| ICECOM | LFIRE | NAVSEC |
| IFBMIS | LTARG | NSTHFF |
| IPHASE | MANHEL | NUMBER |
| ISORG | MANLDR | TMISUN |
| IUNACT | MANTYP | |
| JPHASE | MCLASS | |
| JUNACT | MDFAF | |

SUBROUTINES REQUIRED:

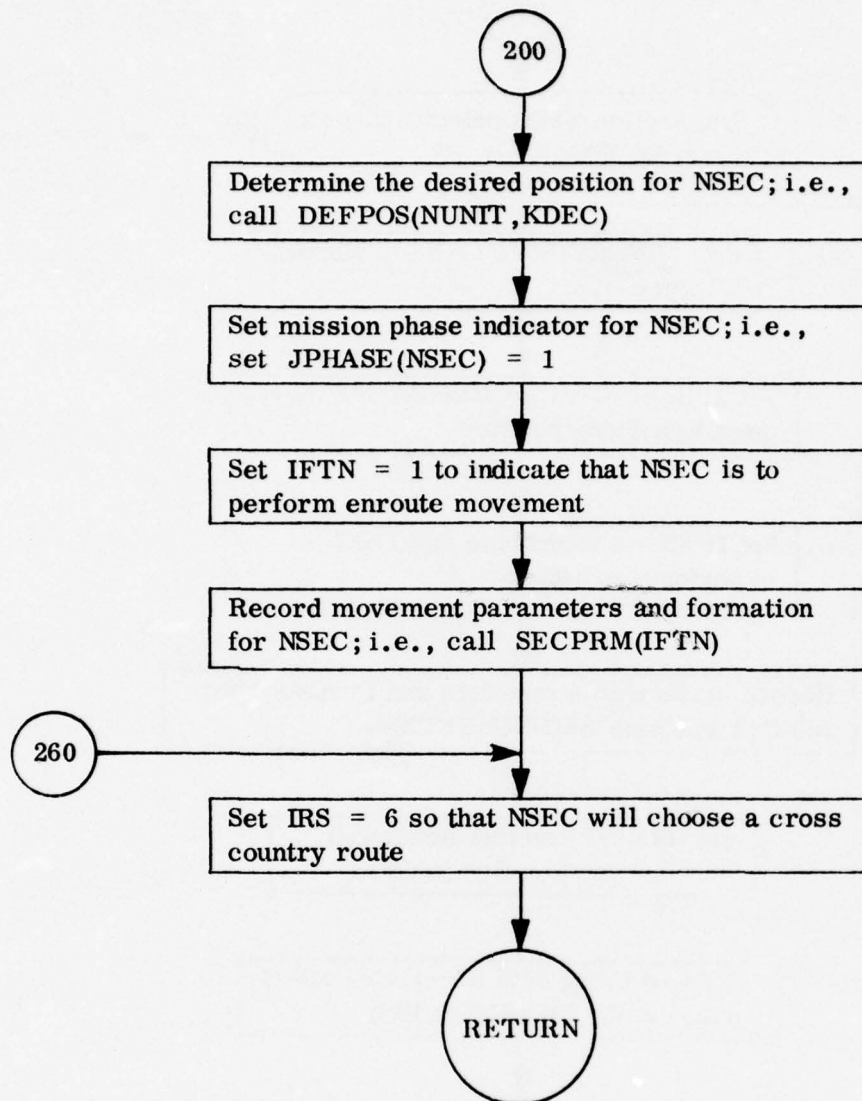
| | |
|--------|--------|
| AIRFIR | DEFPOS |
| ATKPRM | HFORM |
| CBFIR | SECPRM |
| CBOBS | |



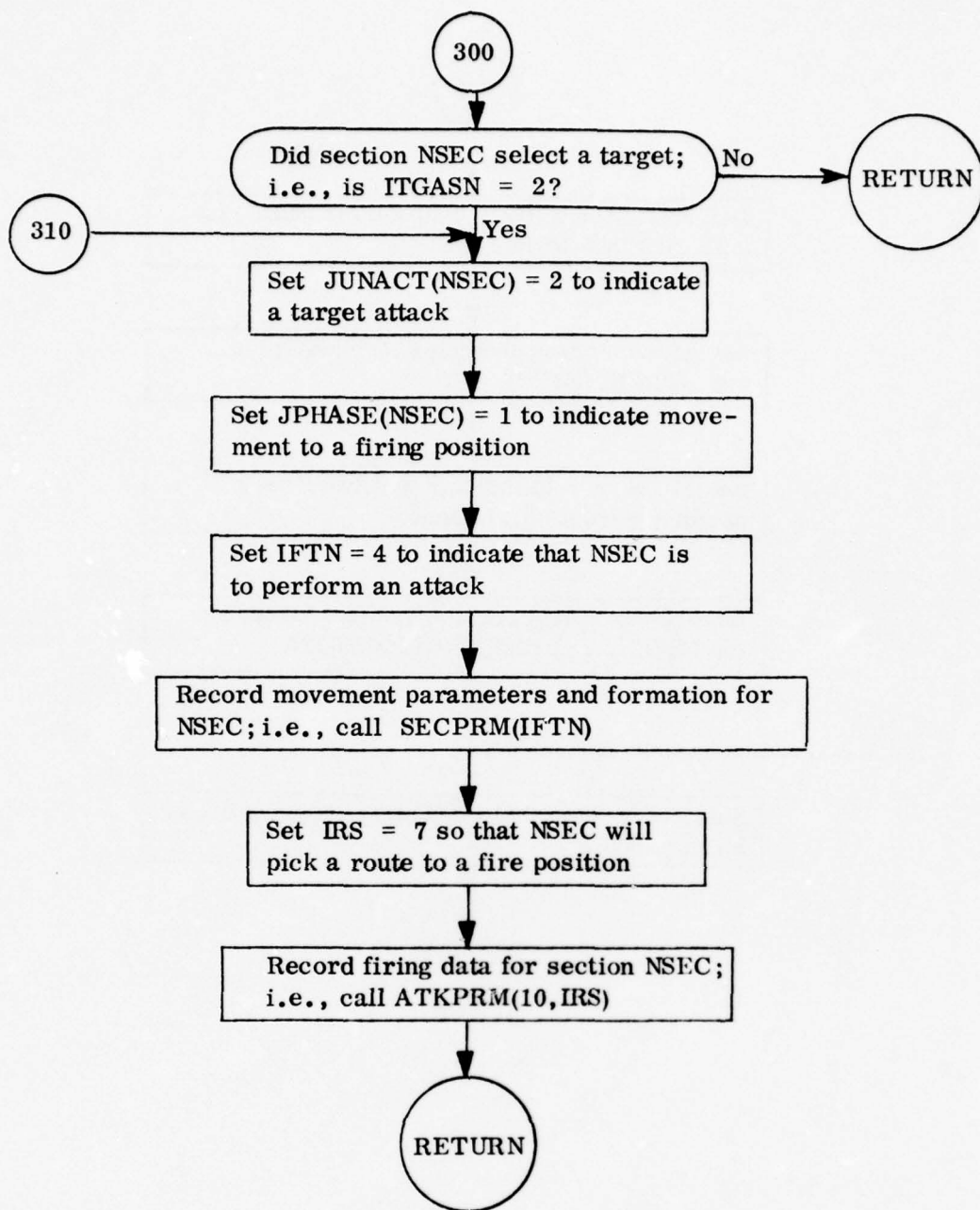
Subroutine HELFIR: Aerial Section Fire Controller



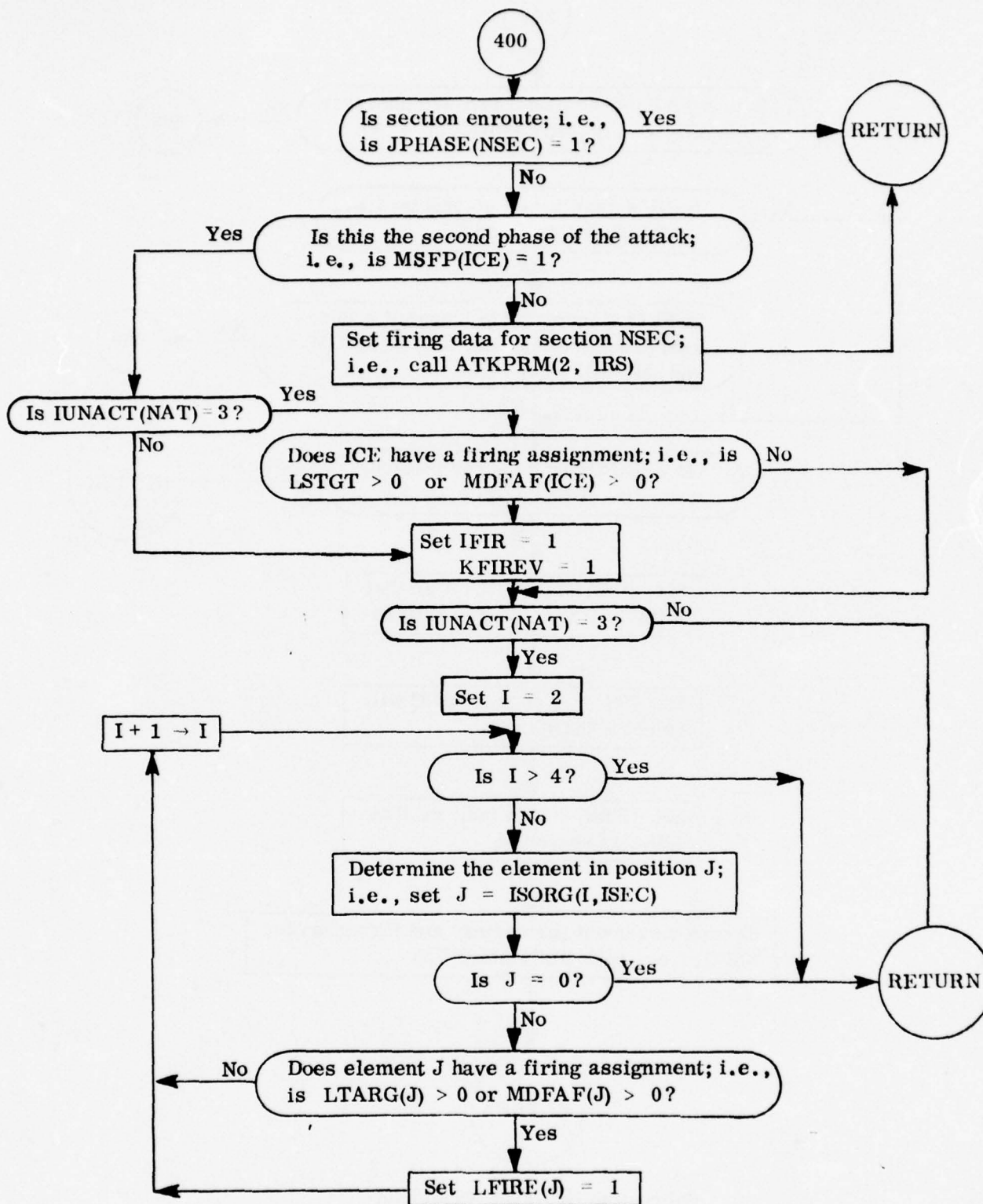
Subroutine HELFIR: Continued



Subroutine HELFIR: Continued

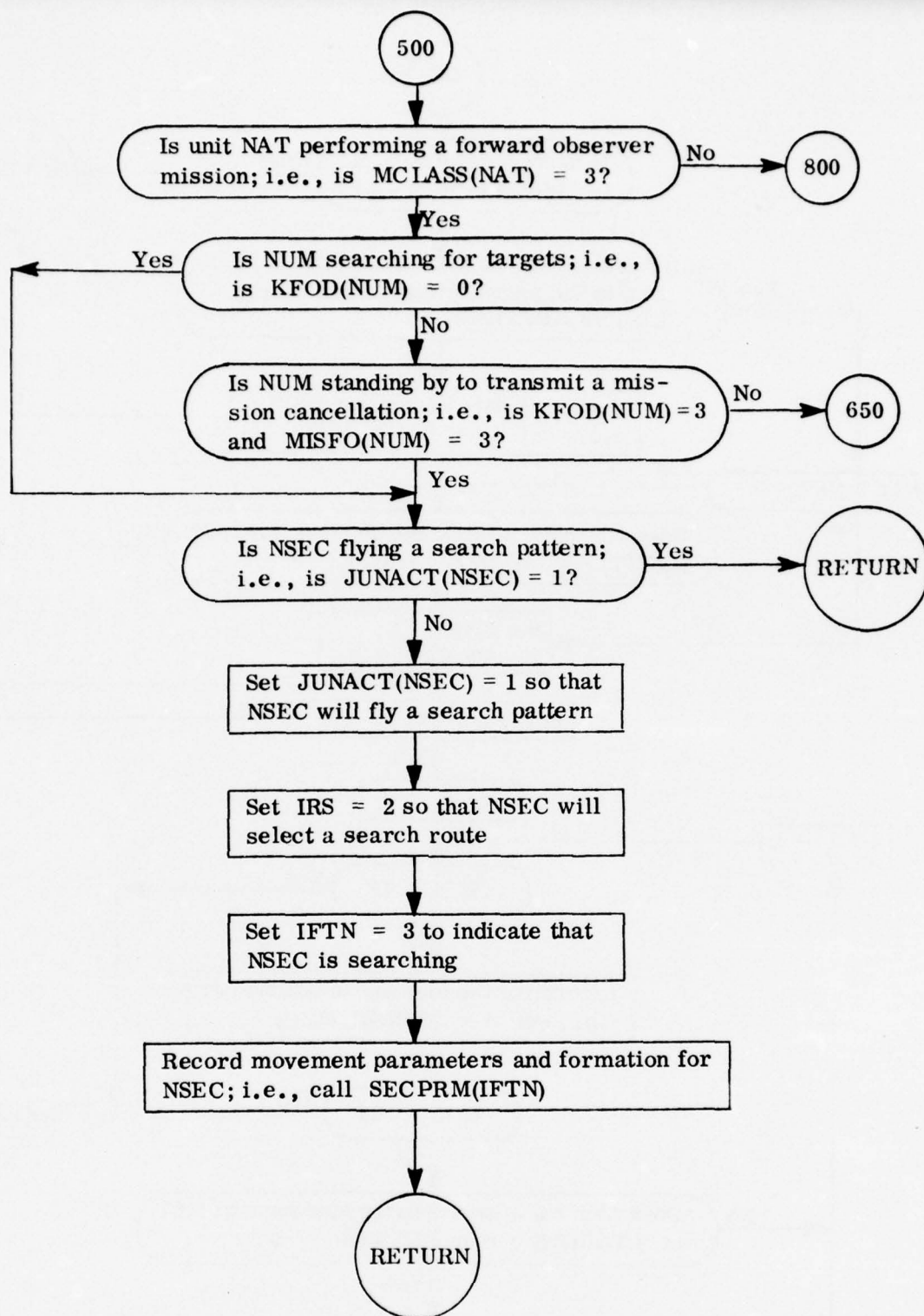


Subroutine HELFIR: Continued

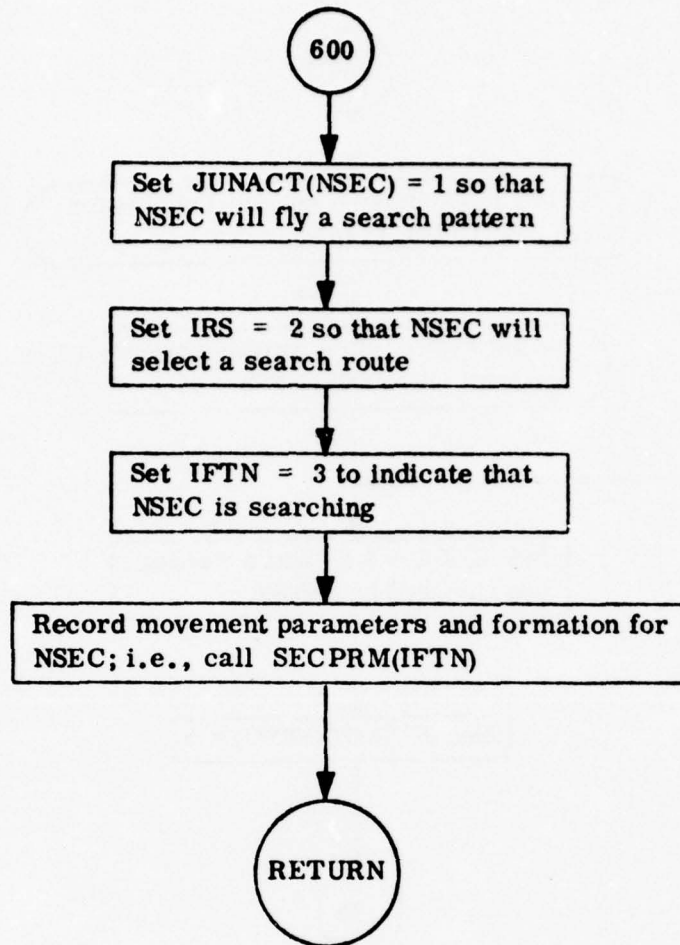


Subroutine HELFIR: Continued

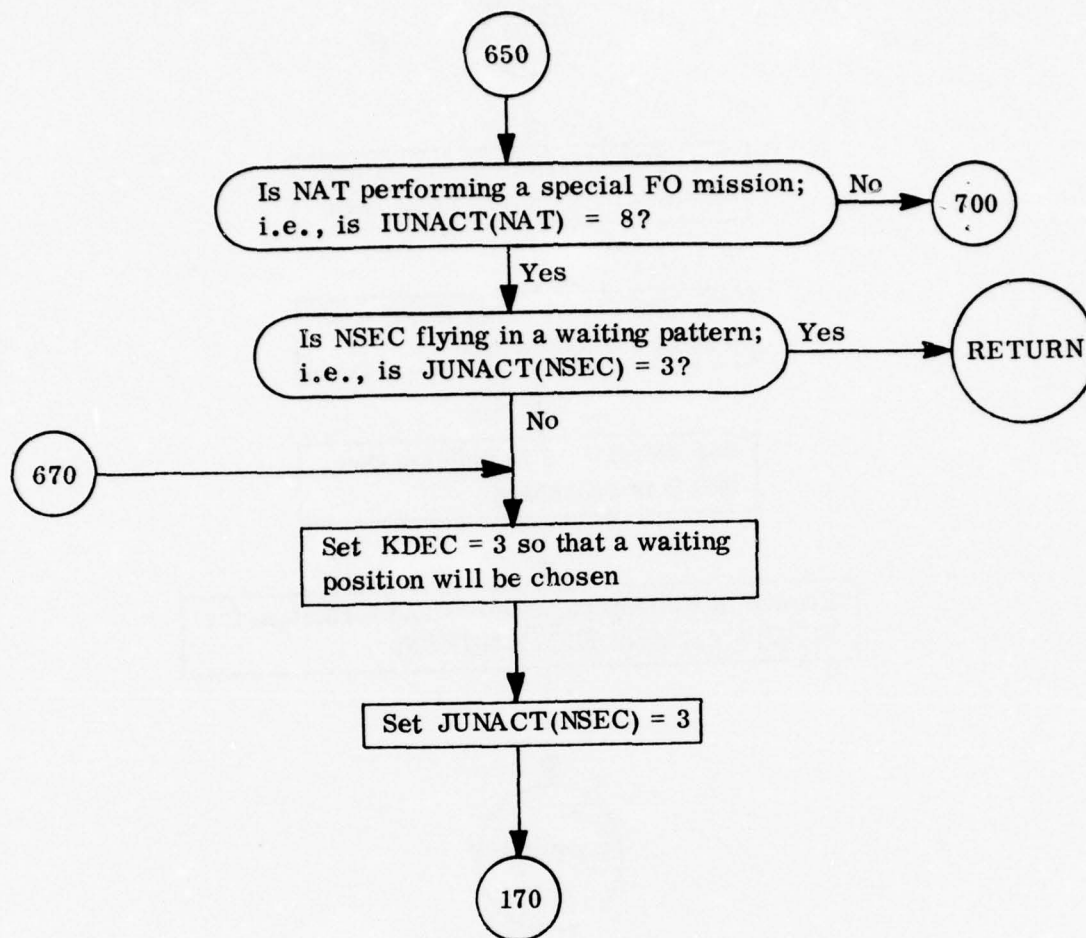
B-417



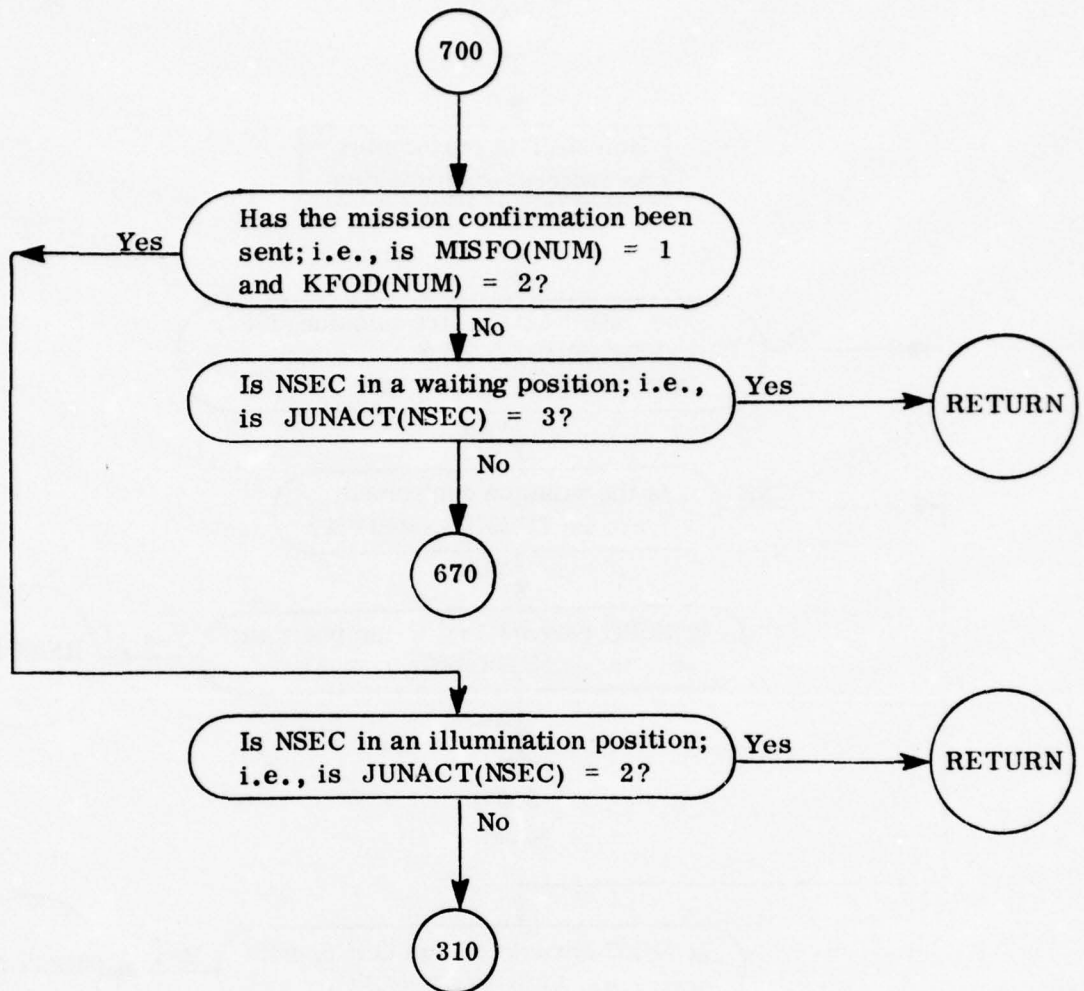
Subroutine HELFIR: Continued



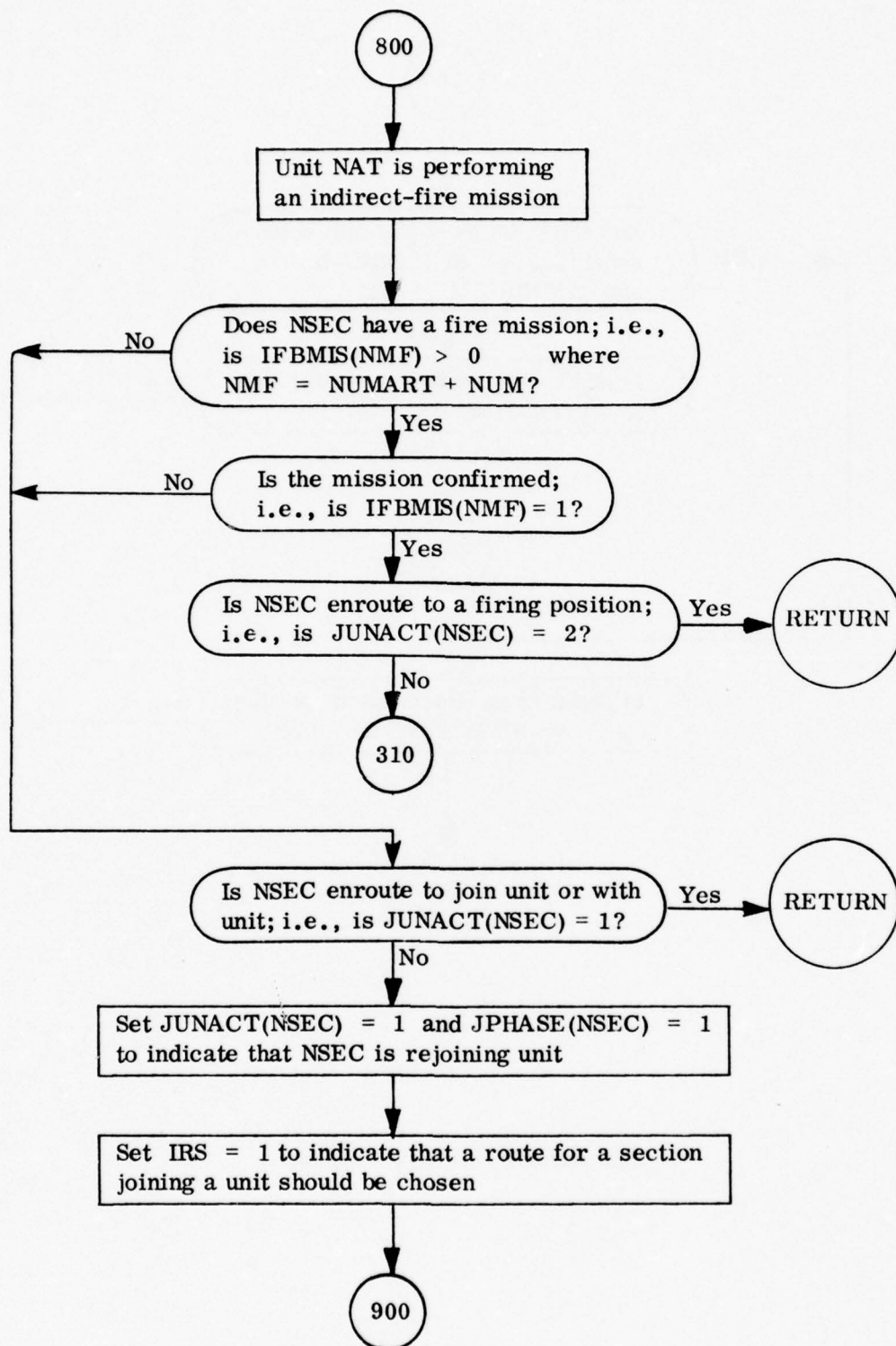
Subroutine HELFIR: Continued



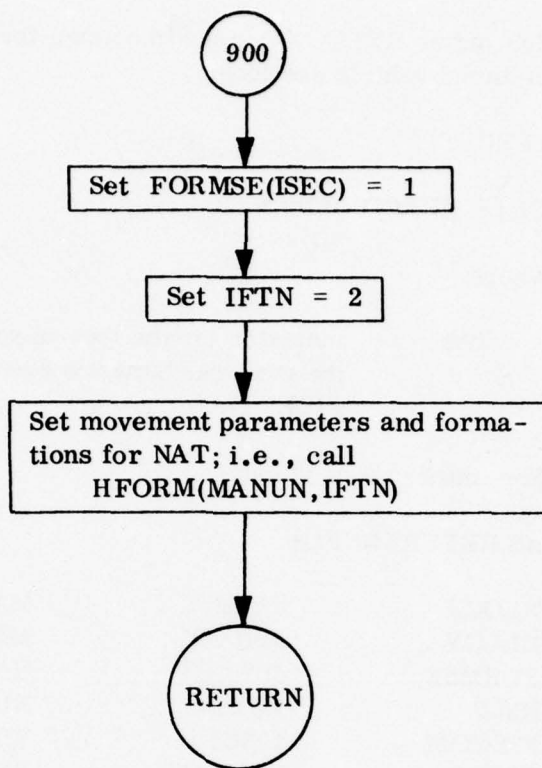
Subroutine HELFIR: Continued



Subroutine HELFIR: Continued



Subroutine HELFIR: Continued
B-422



Subroutine HELFIR: Continued

Subroutine HELCON

PURPOSE: Subroutine HELCON is used to control the movement and firing of aerial vehicle sections.

CALLING SEQUENCE:

CALL HELCON(IRS)

where

IRS = indicator for the type of route selected during the current element's event (see subroutine PICKRT)

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

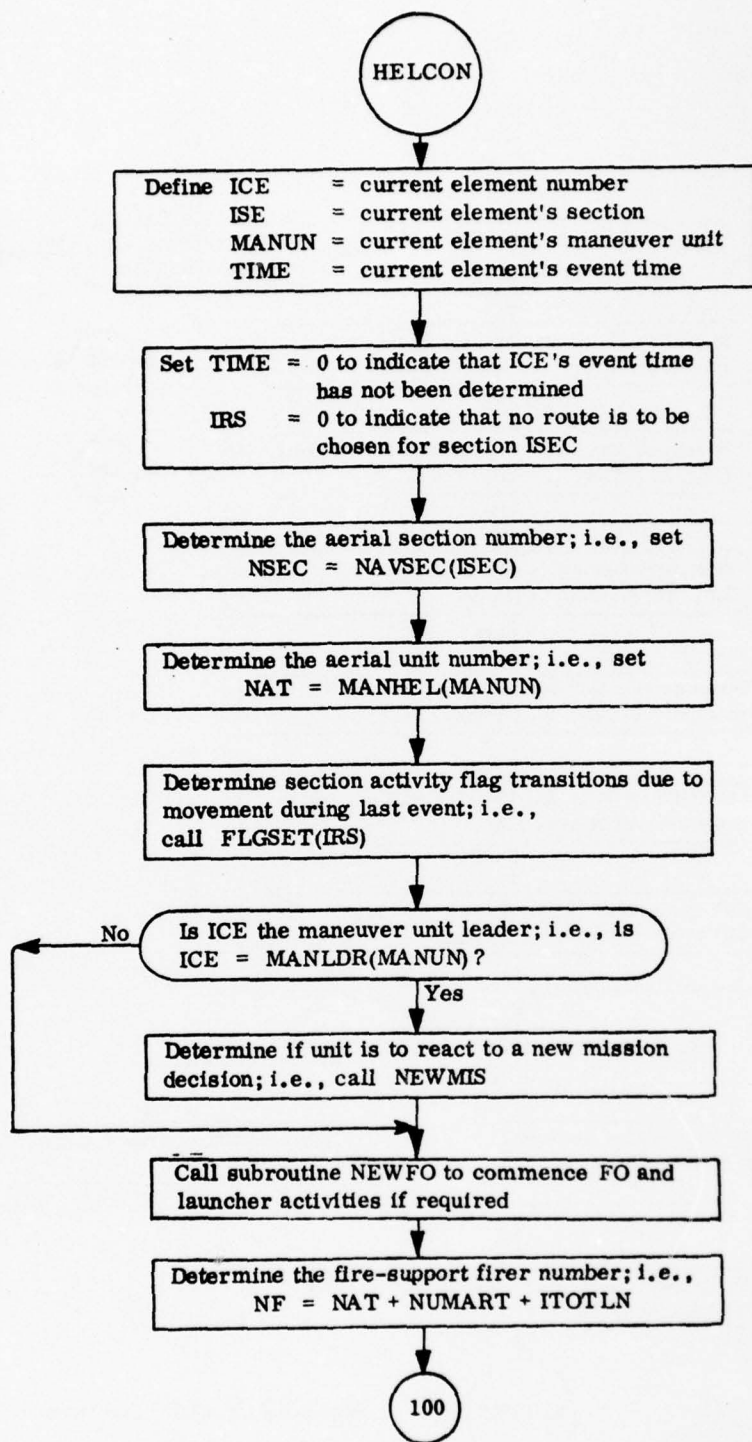
| | | |
|--------|--------|--------|
| ELOCK | IUNACT | MANTYP |
| ELOCY | JPHASE | MCLASS |
| FORMSE | JUNACT | NAVSEC |
| ICAP | LKILL | NUMBER |
| ICECOM | LMUFL | XD |
| IPHASE | MANACT | XS |
| ISORG | MANHEL | YD |
| ISACT | MANLDR | YS |

SUBROUTINES REQUIRED:

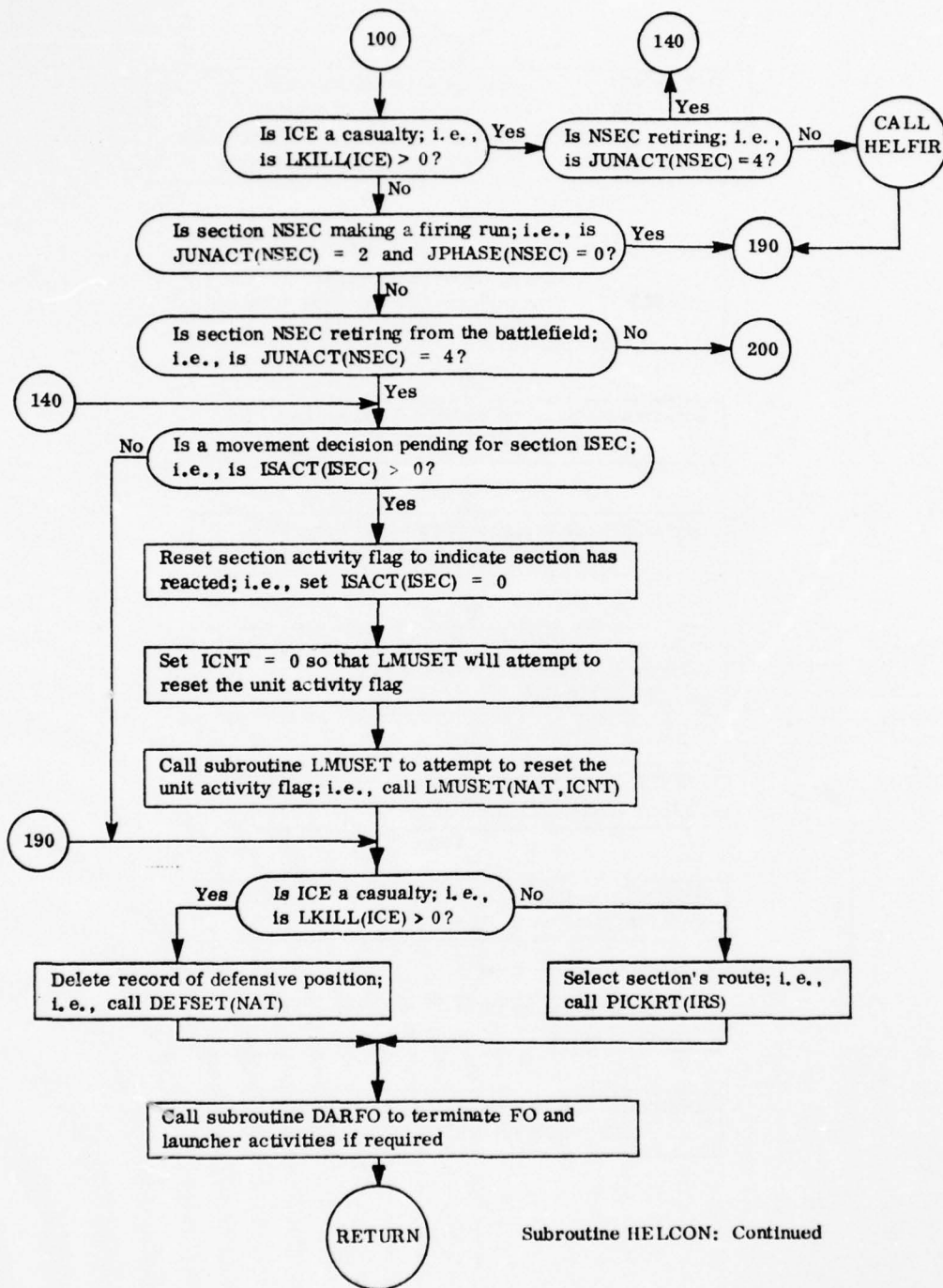
| | | |
|--------|--------|--------|
| DARFO | HFORM | RETIRE |
| DEFPOS | LMUSET | SECPRM |
| DEFSET | NEWMIS | |
| FLGSET | NEWFO | |
| HELFIR | PICKRT | |

HELCON CALLED BY: MAIN

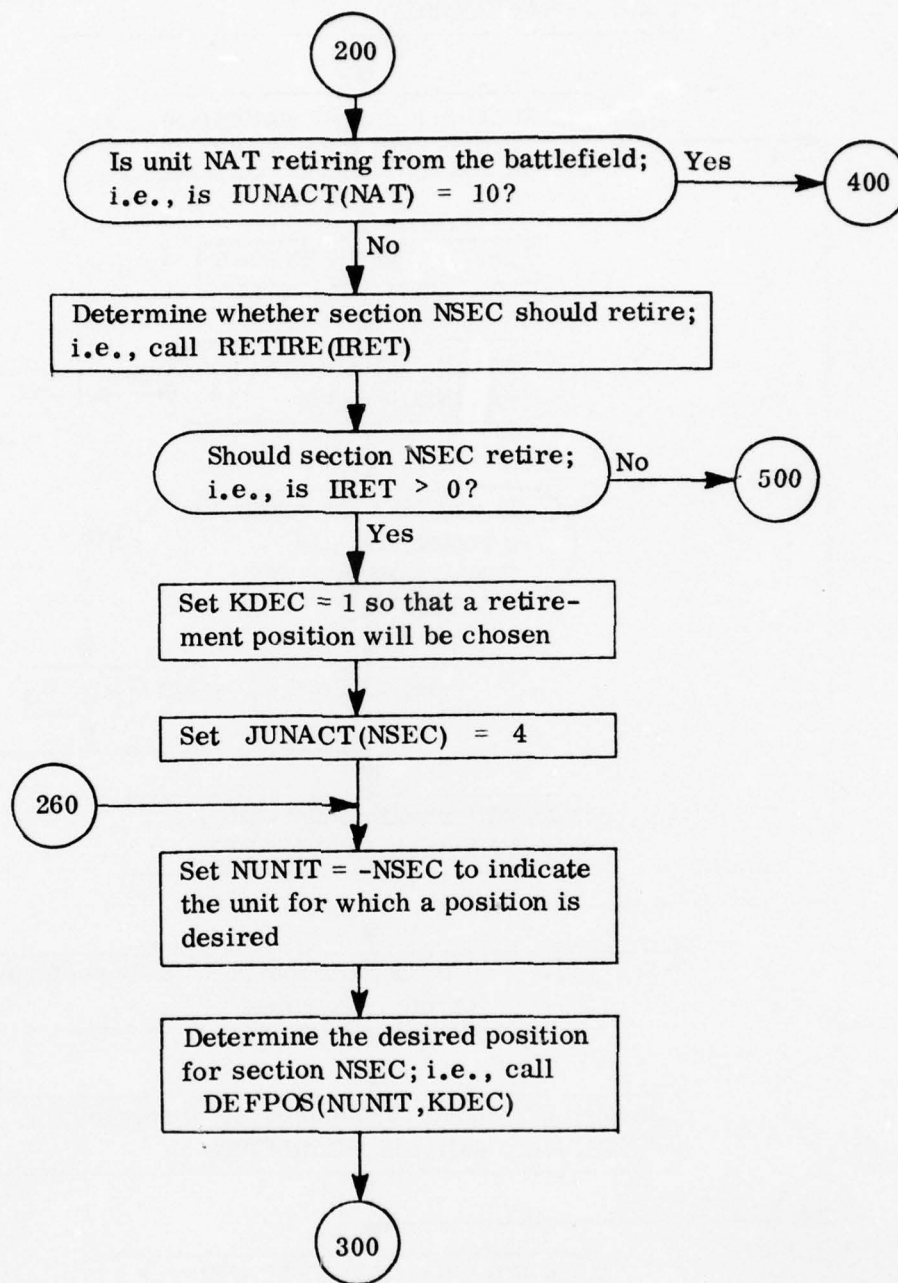
LENGTH: $A60_{16} = 2656_{10}$ bytes



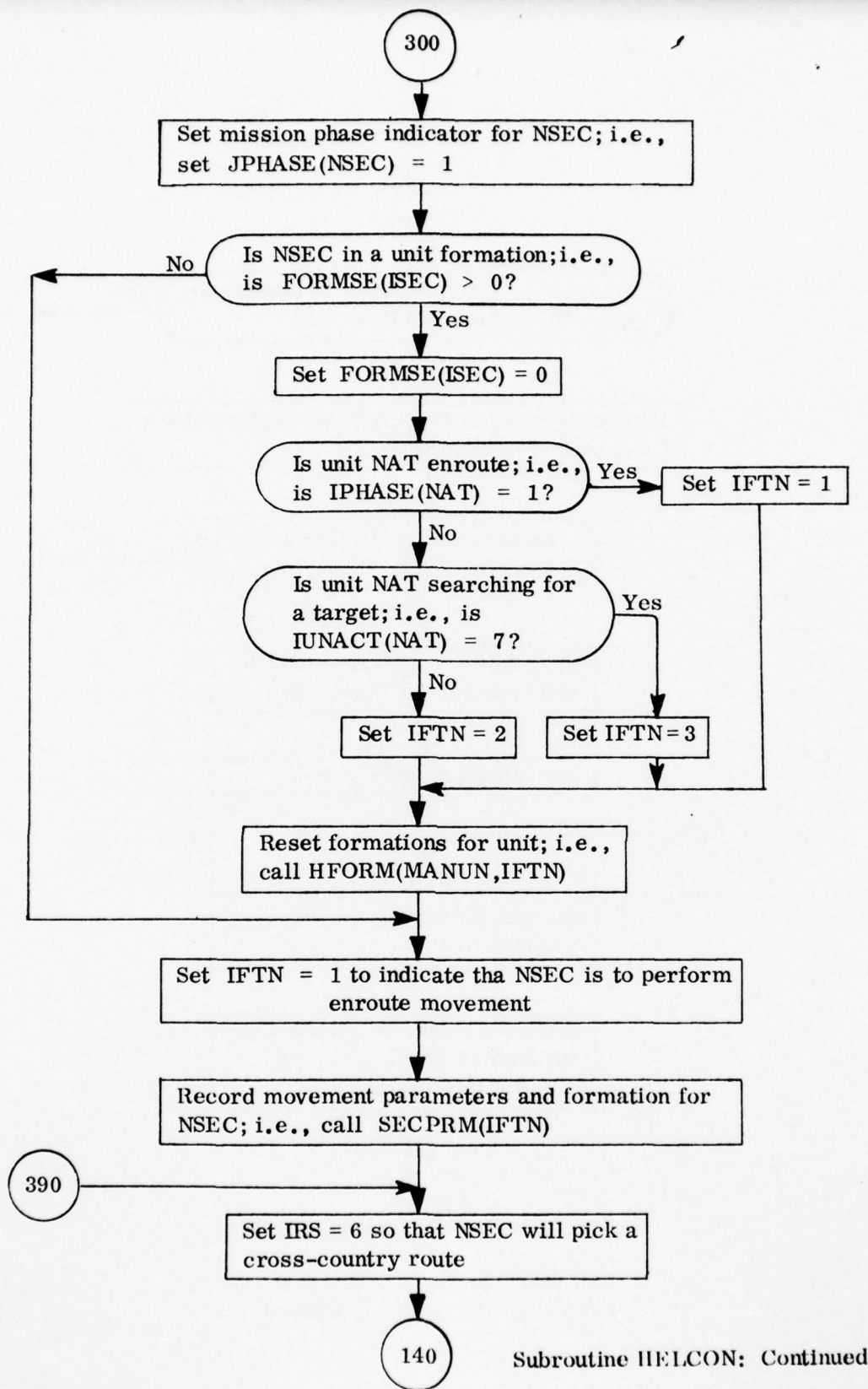
Subroutine HELCON: Aerial Section Movement and Fire Controller
B-425



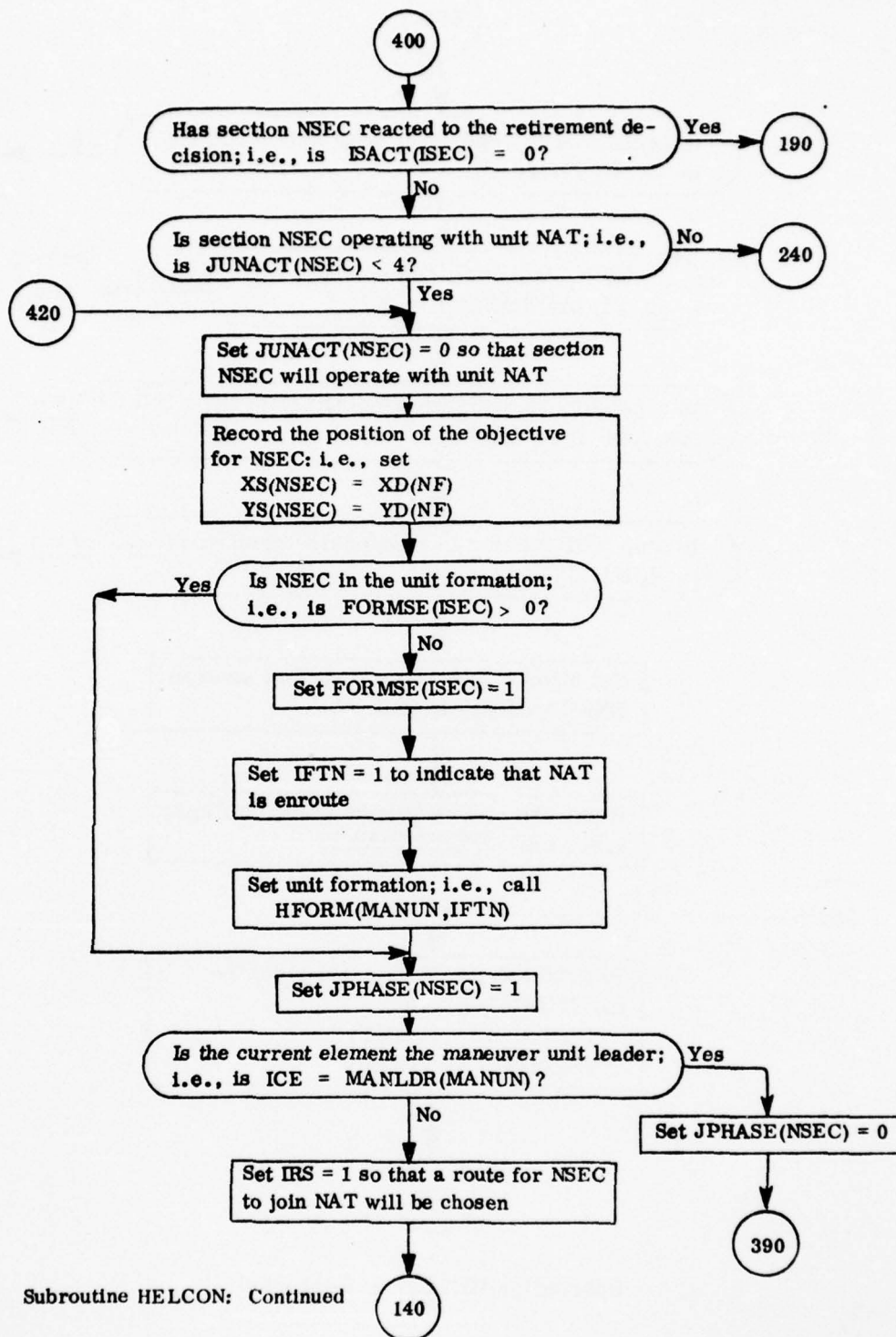
Subroutine HELCON: Continued

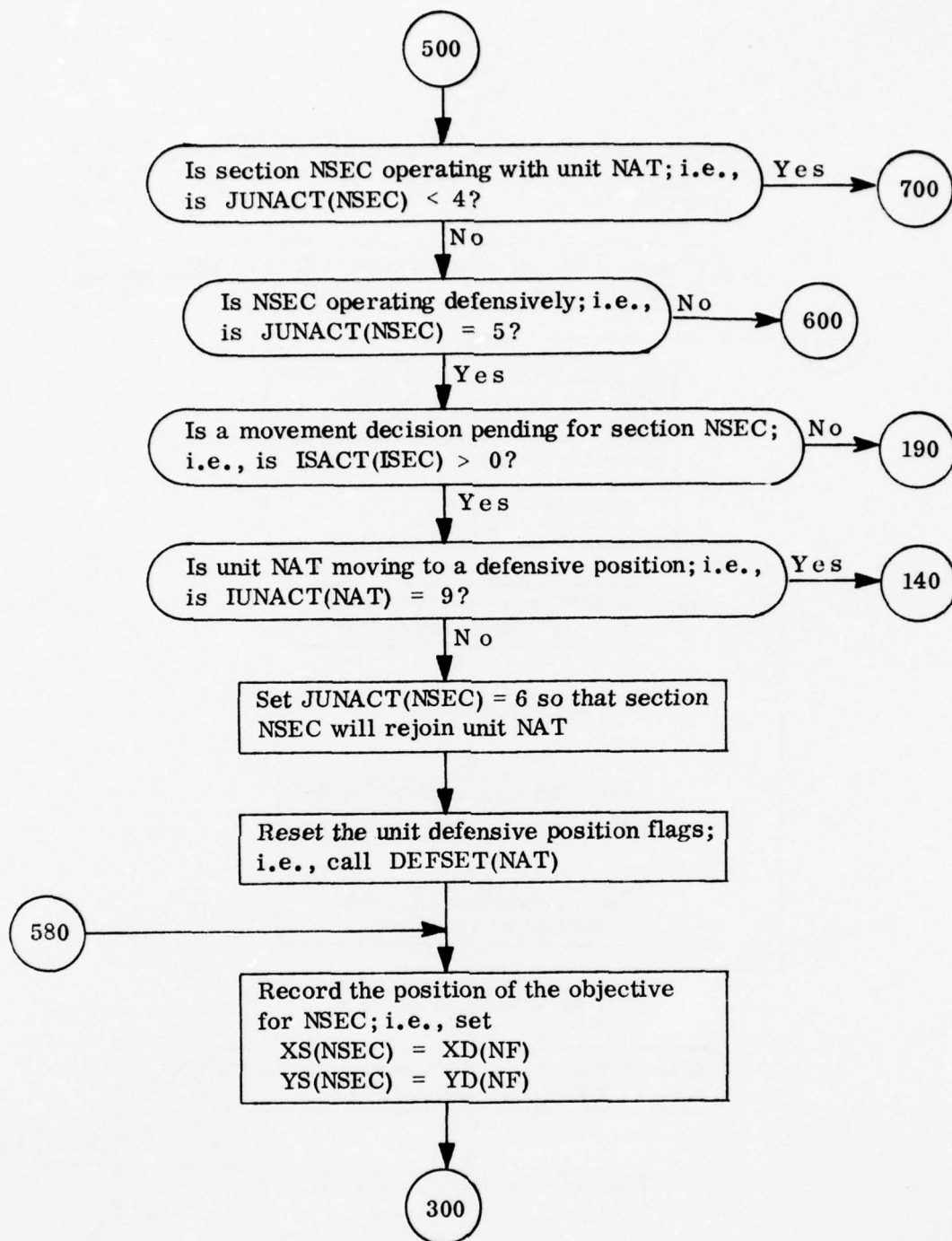


Subroutine HELCON: Continued

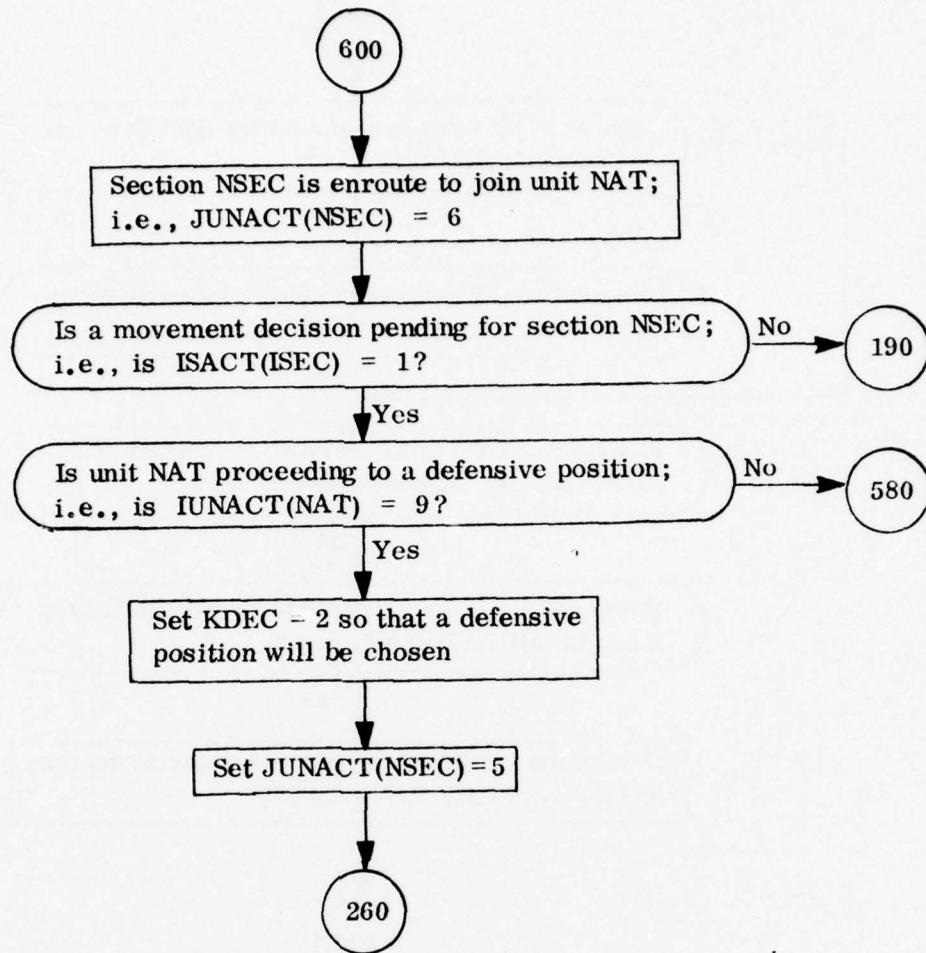


Subroutine HELCON: Continued

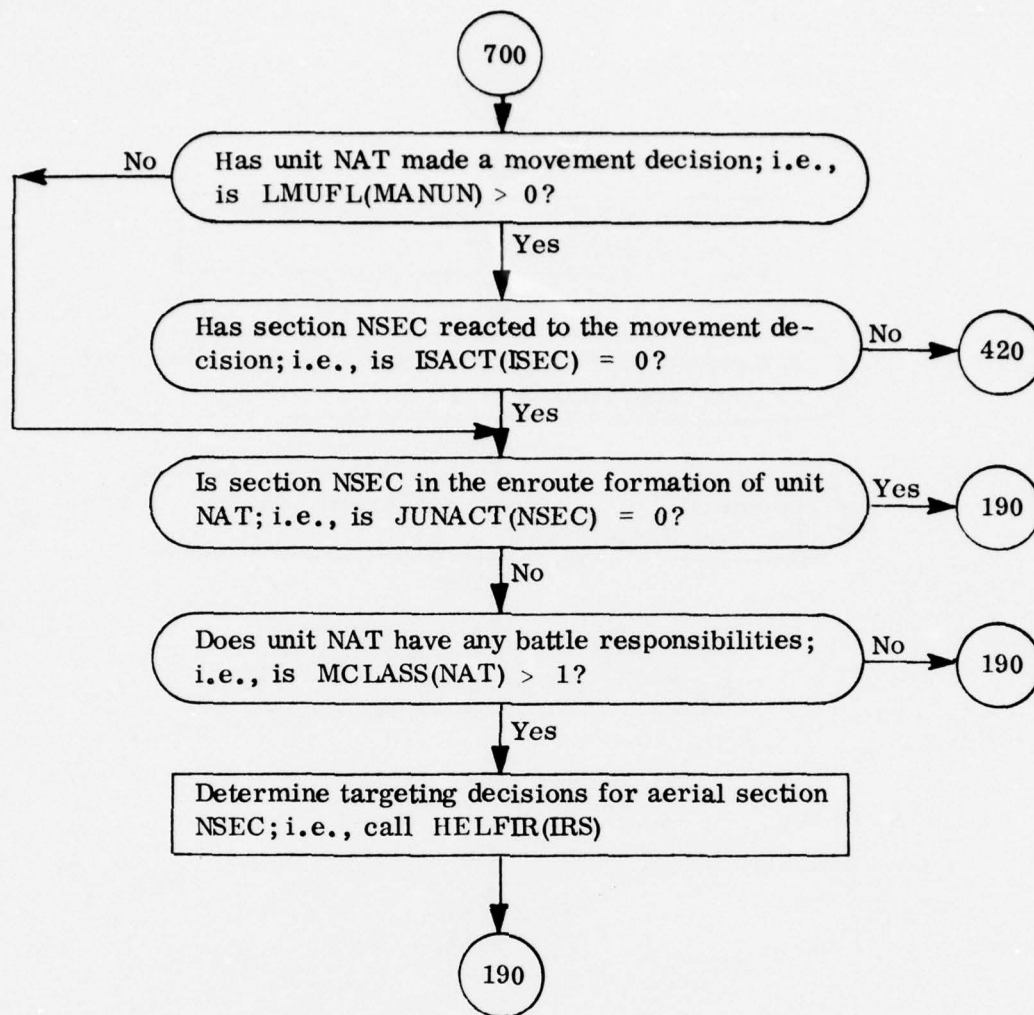




Subroutine HELCON: Continued



Subroutine HELCON: Continued



Subroutine HELCON: Continued

Subroutine HELMOV

PURPOSE: Subroutine HELMOV is used to represent movement of aerial vehicle elements.

CALLING SEQUENCE:

CALL HELMOV(IRS)

where

IRS = indicator for the type of route selected during the current element's event (see subroutine PICKRT)

METHOD: See Chapter 7 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|-------|--------|--------|
| EDIR | EVHTIM | LFPC |
| ELOCX | ICECOM | LHICE |
| ELOCY | ISORG | MANHEL |
| ELOCZ | IUNACT | MSFP |
| ESPD | JPHASE | NAVSEC |
| ETIM | JUNACT | NUMBER |
| EVBAR | LCPE | RFUEL |
| | LDPC | WFUEL |

SUBROUTINES REQUIRED:

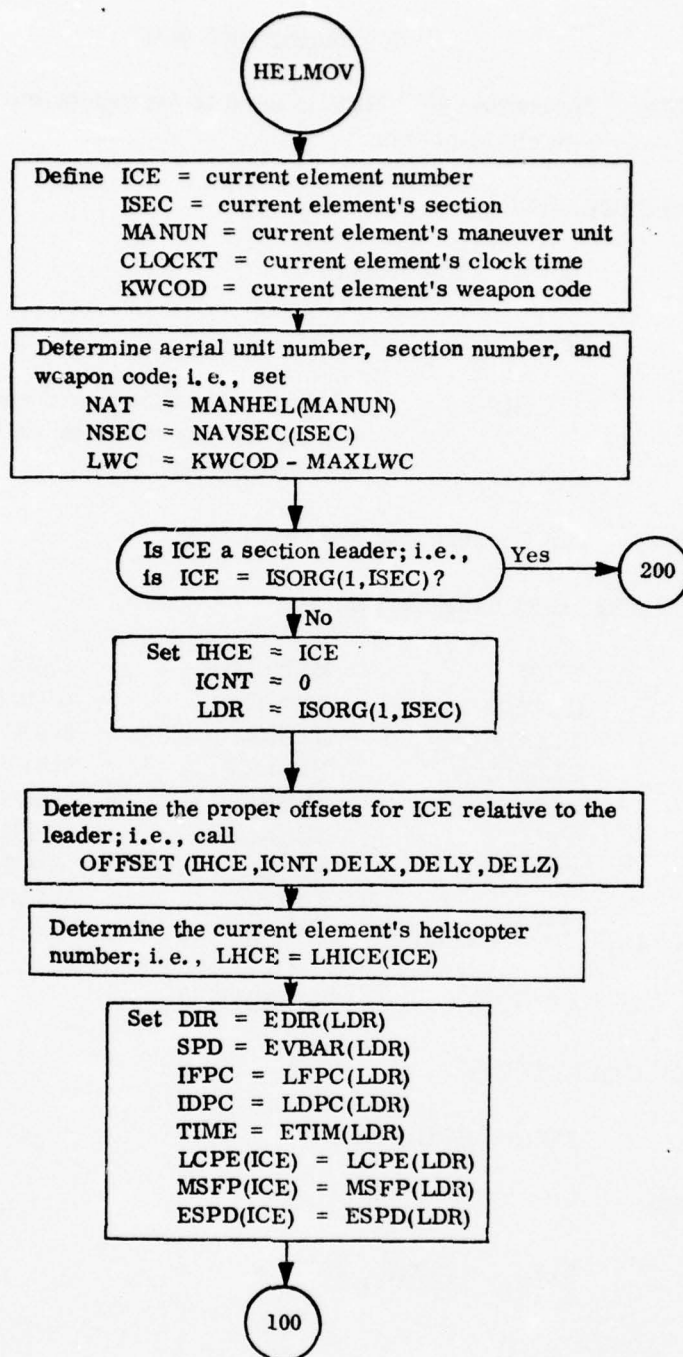
APFDYS OFFSET

HELMOV CALLED BY:

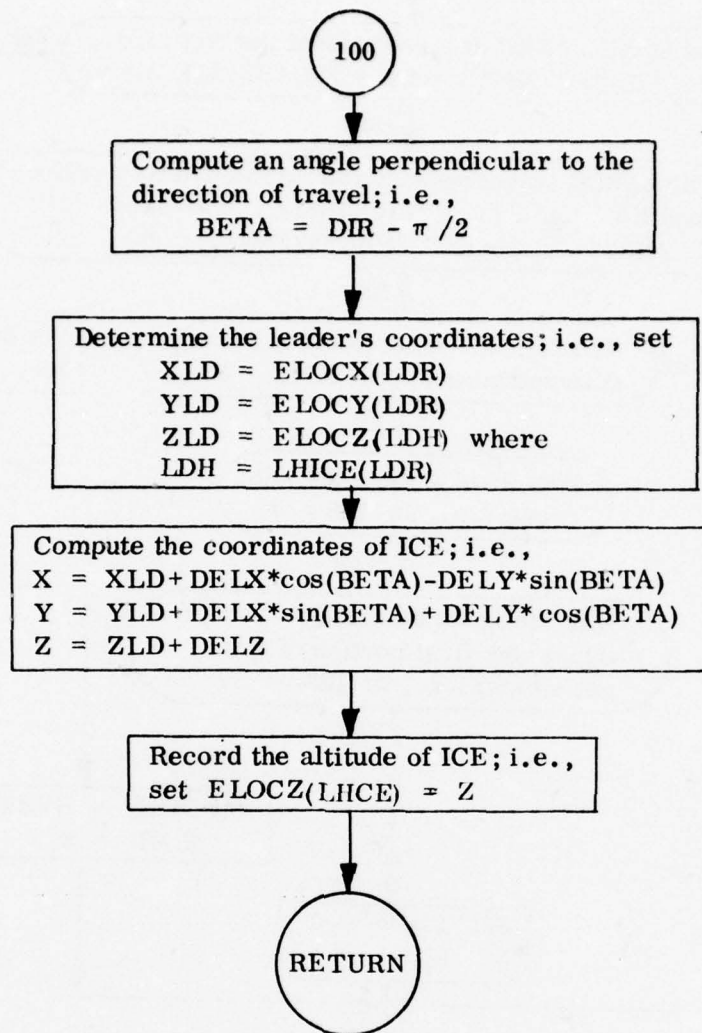
MAIN PROGRAM

LENGTH:

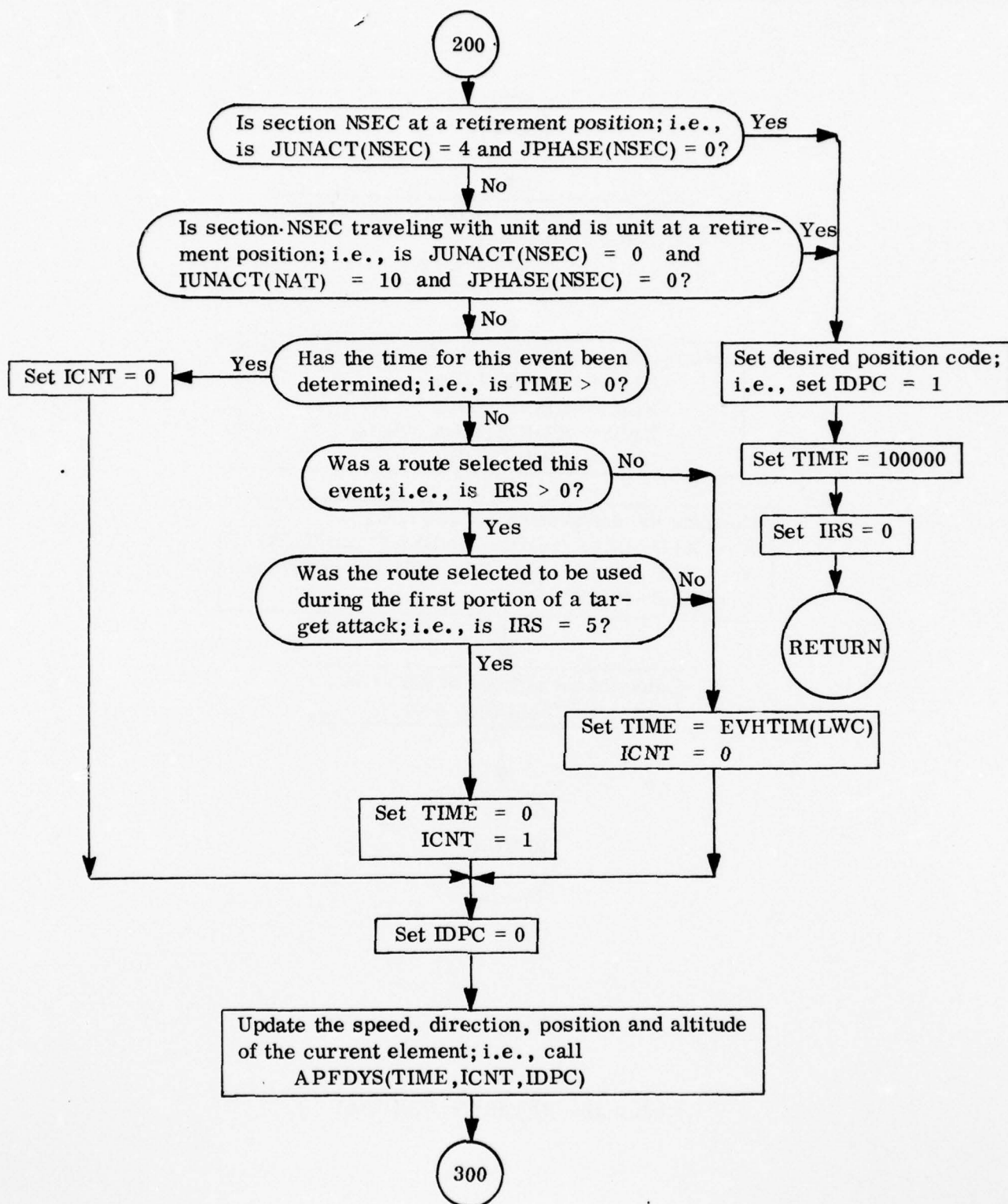
$91E_{16} = 2334_{10}$ BYTES



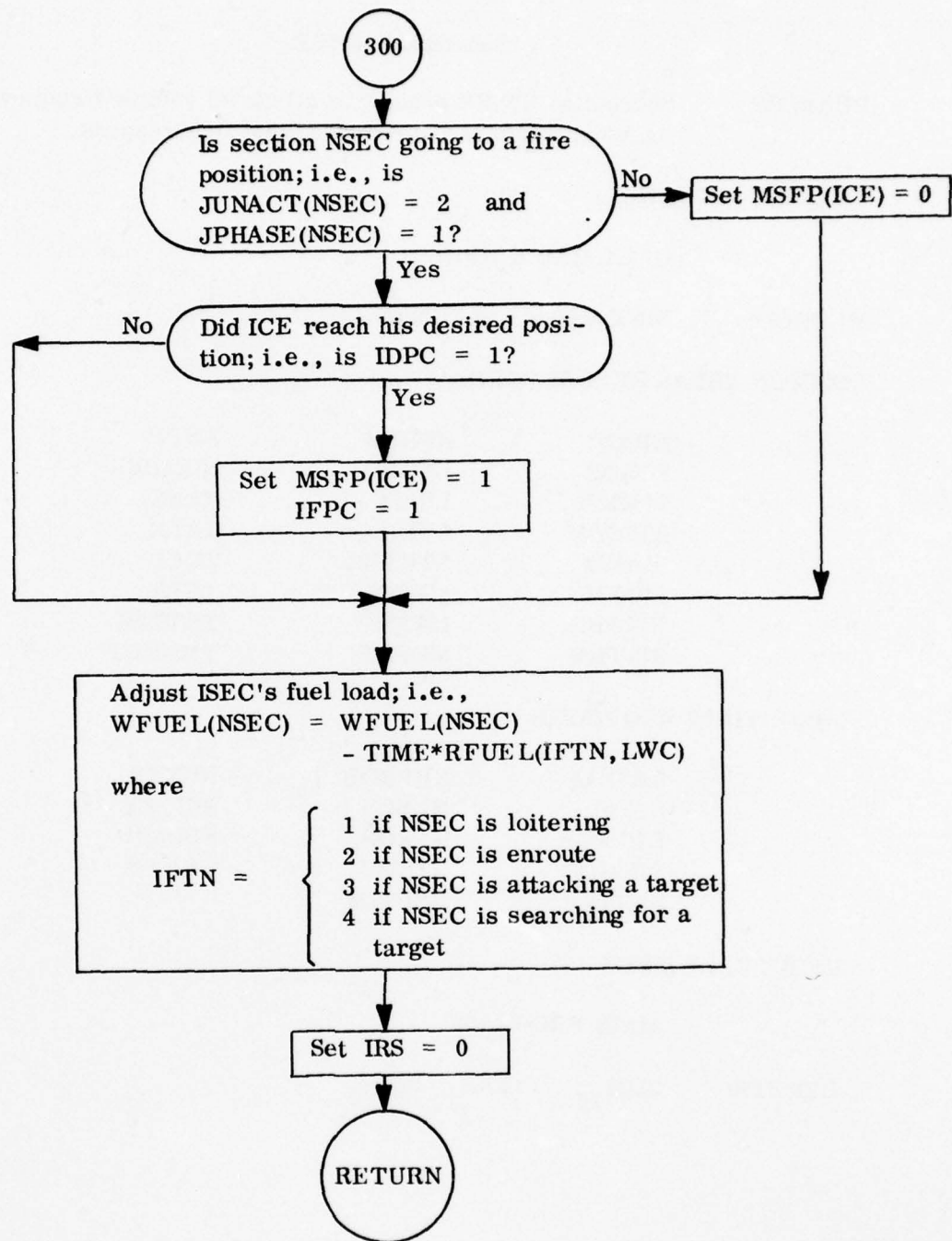
Subroutine HELMOV: Aerial Element Movement Model



Subroutine HELMOV: Continued



Subroutine HELMOV: Continued



Subroutine HELMOV: Continued

Subroutine HFIRE

PURPOSE: Subroutine HFIRE processes all aerial vehicle firing events including suppressive fire and point fire weapons.

CALLING SEQUENCE:

CALL HFIRE (IFIR)

METHOD: See Chapter 8 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| BRAIR | KFRND | MSFP |
| EMICR | LFRND | NUMBER |
| IAMMO | LHICE | RANGE |
| ICECOM | LKILL | TALK |
| IHAMO | LTHTNK | TCOV |
| IHDFMC | LWCOD | TFLY |
| IHTARG | LWSYS | TGTDIM |
| IHTPRB | MDFAF | TMNEUT |

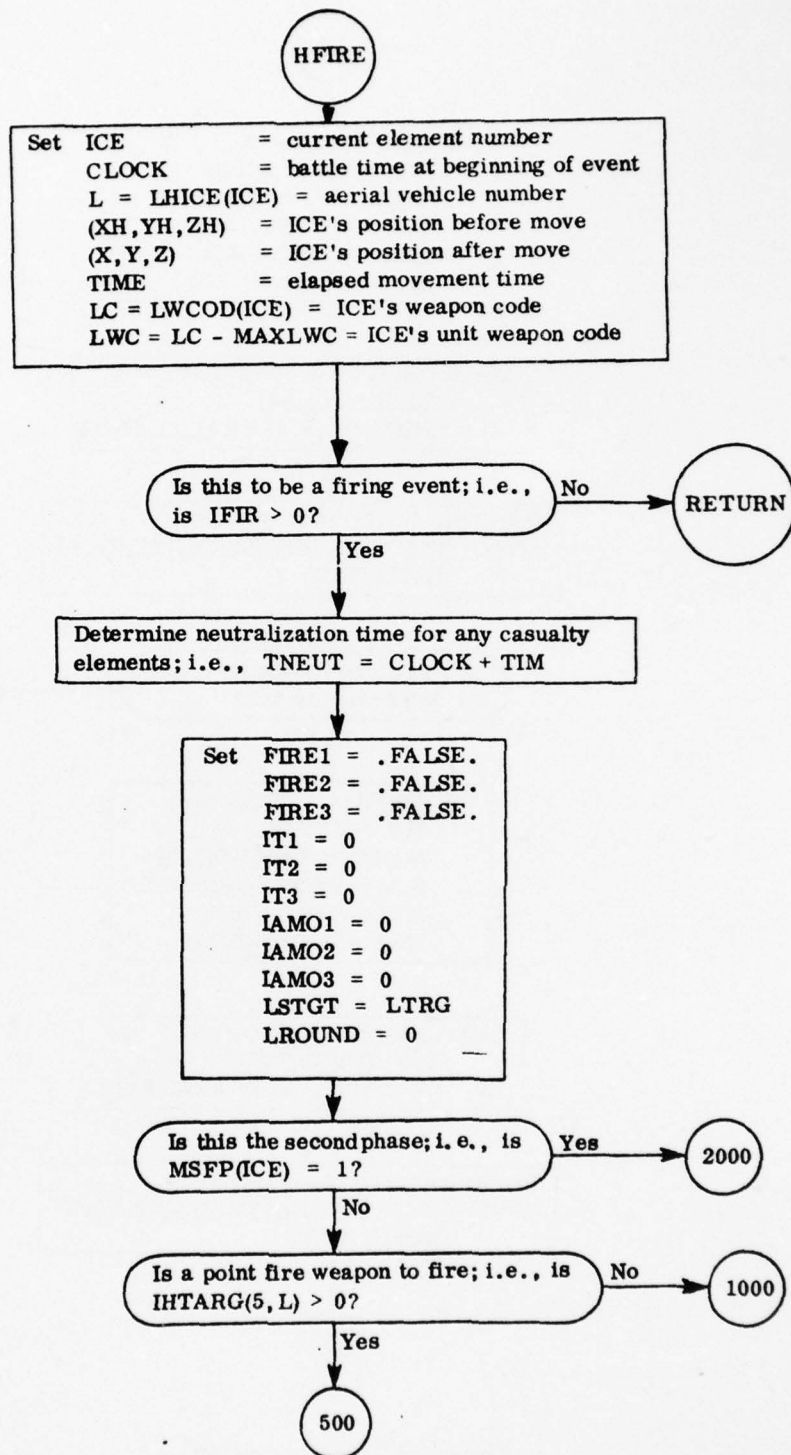
SUBROUTINES REQUIRED:

| | | |
|--------|--------|--------|
| CASELE | HHPROB | RGXYZ |
| ELOC | HLNCH | SHILLY |
| ELVATE | HPROB | SPDASP |
| FIRMOD | HTCOV | TLETH |
| HFTIME | NEUTIM | |

HFIRE CALLED BY:

MAIN PROGRAM

LENGTH: $2D10_{16} = 11536_{10}$ bytes



Subroutine HFIRE: Helicopter Firing Model
B-439

AD-A040 054

OHIO STATE UNIV COLUMBUS SYSTEMS RESEARCH GROUP
EXTENSION TO THE LAND COMBAT MODEL (DYNCOM). VOLUME 2, SECTION --ETC(U)
DEC 71 G M CLARK, R J WILHELM
RF-2995-FR 71-2(U)-SEC-2

F/G 15/7

DAAH01-70-C-0713

NL

UNCLASSIFIED

3 OF 6
AD
A040 054

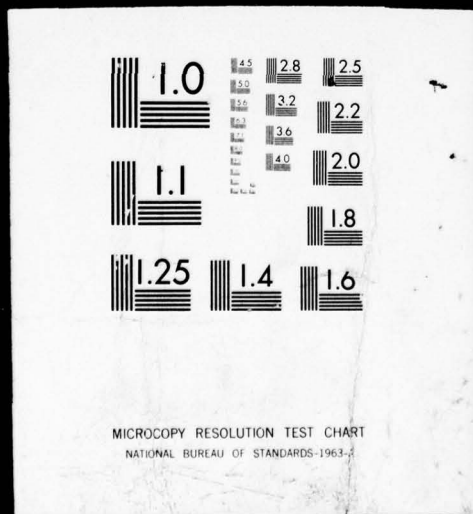


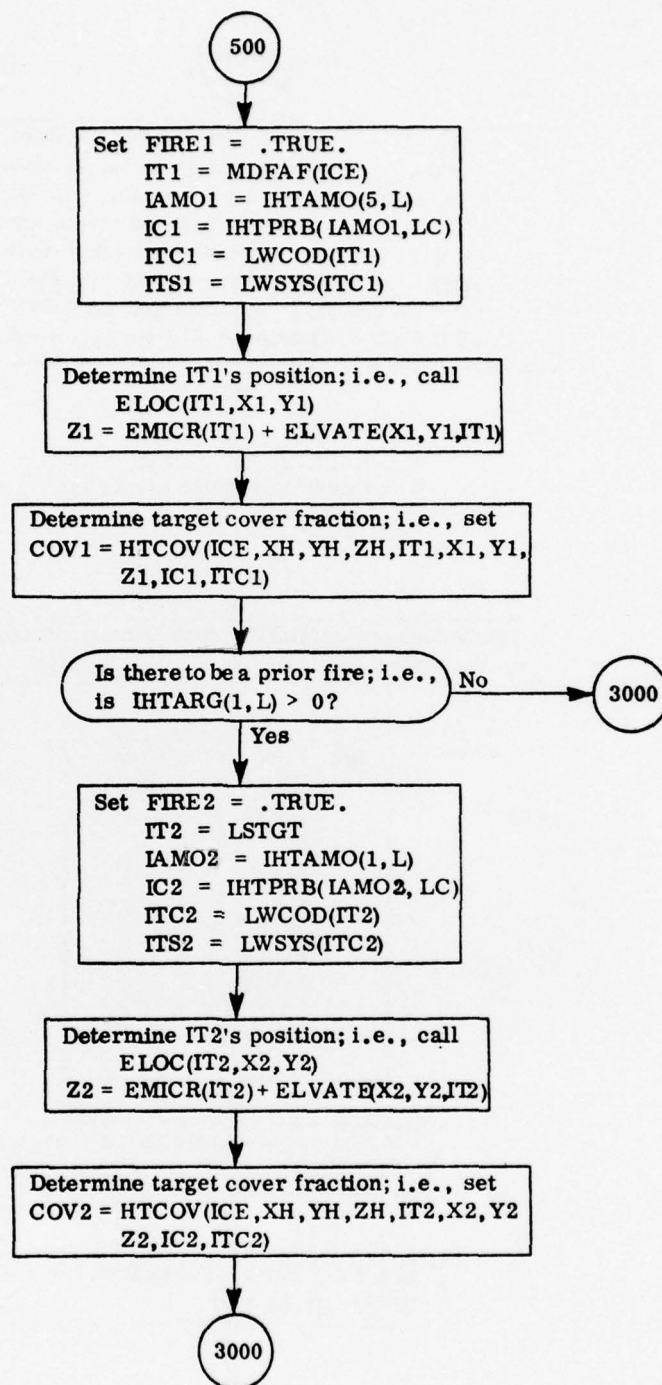
SIFIED

3 OF 6

AD

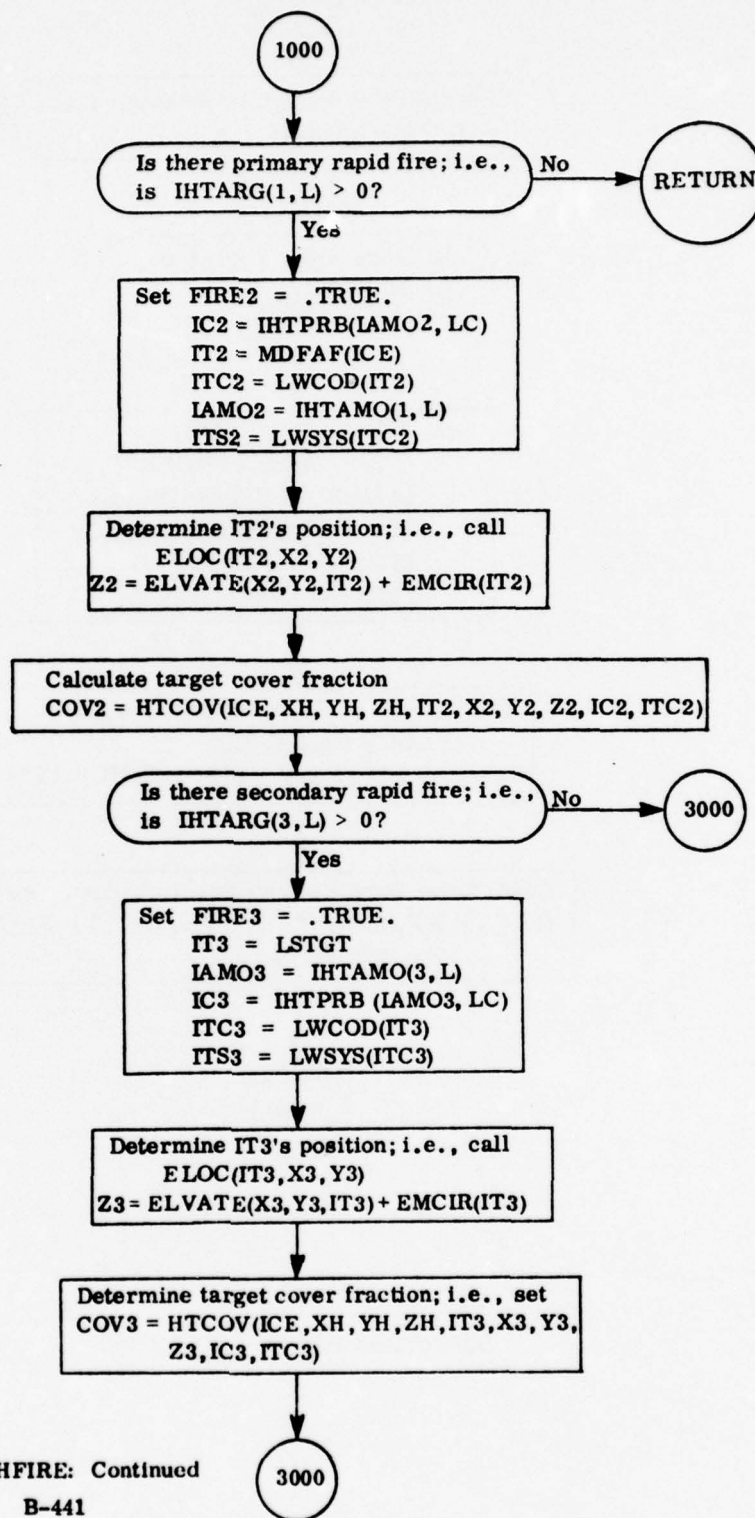
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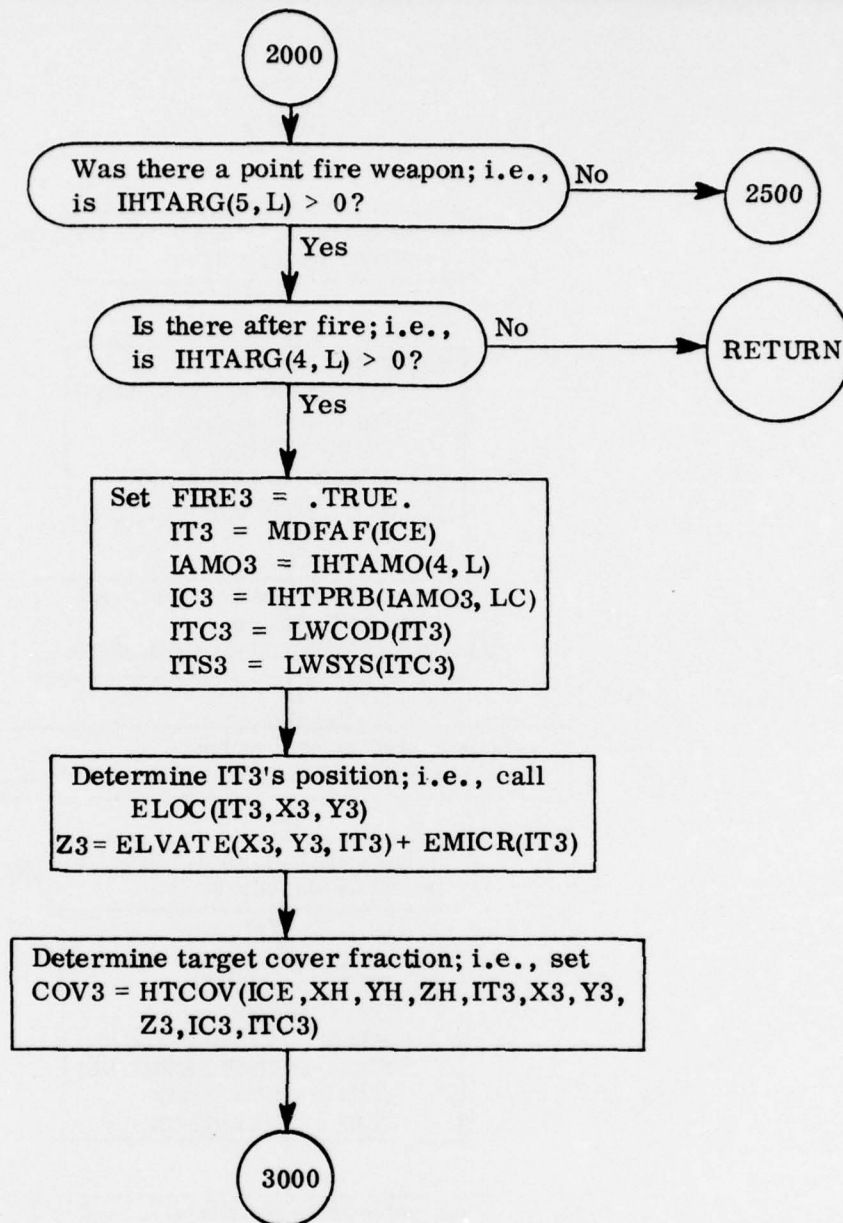


Subroutine HFIRE: Continued

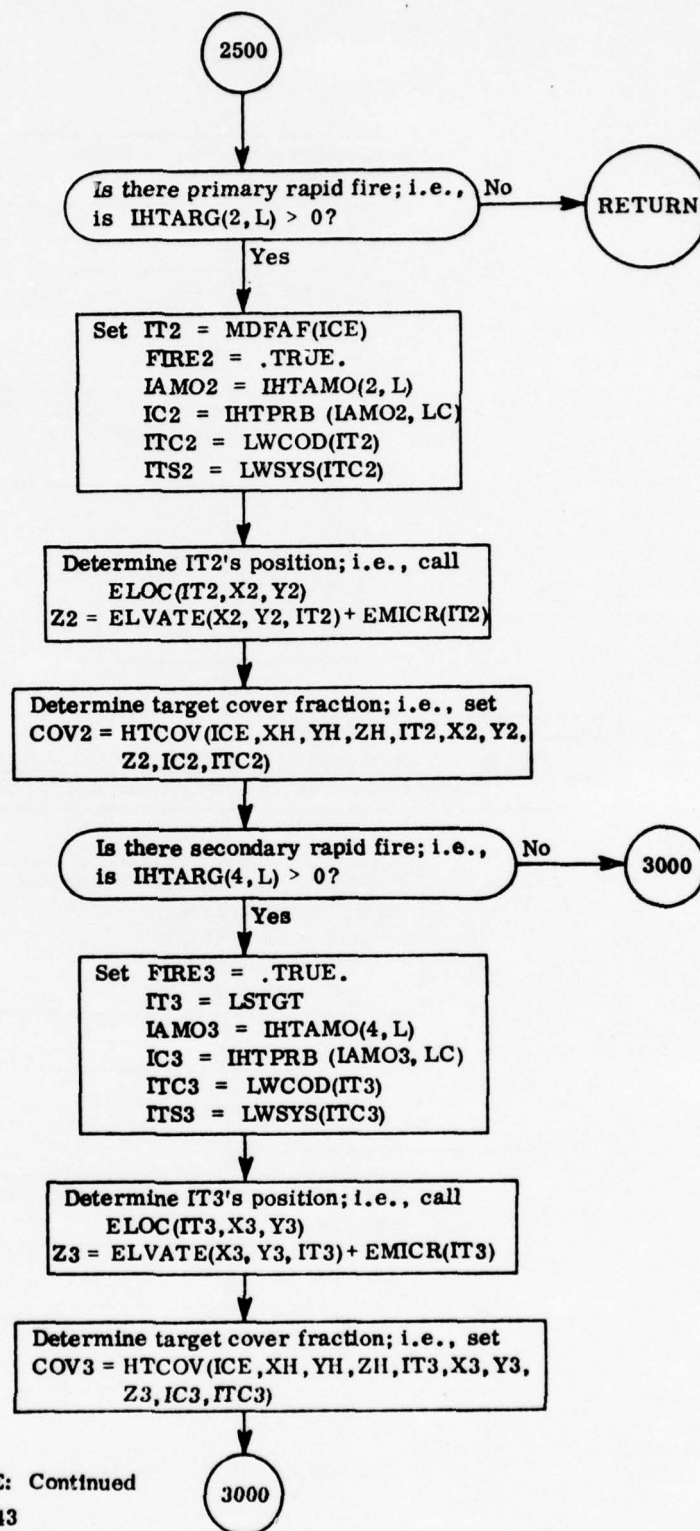
B-440



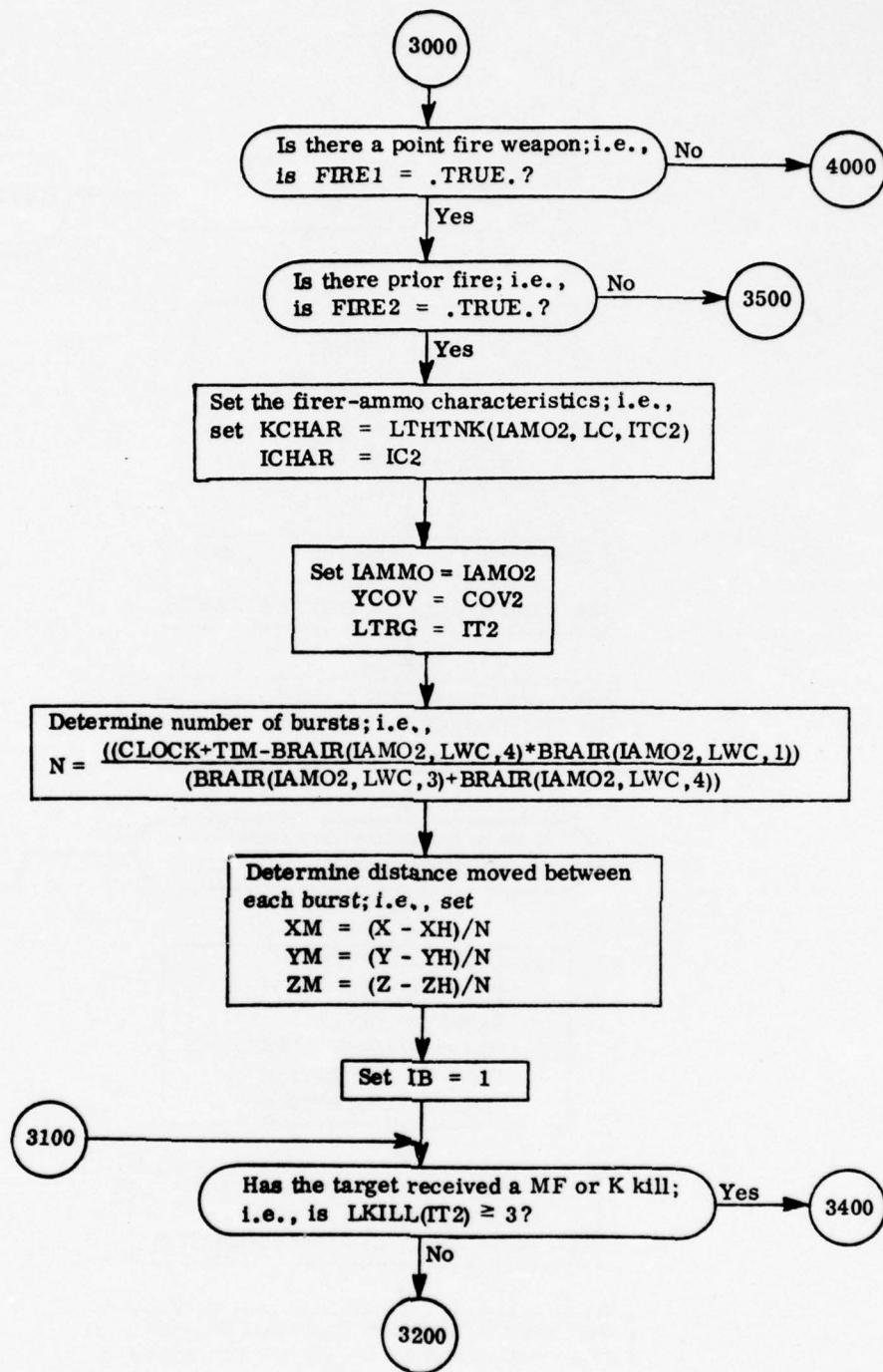
Subroutine HFIRE: Continued
B-441



Subroutine HFIRE: Continued

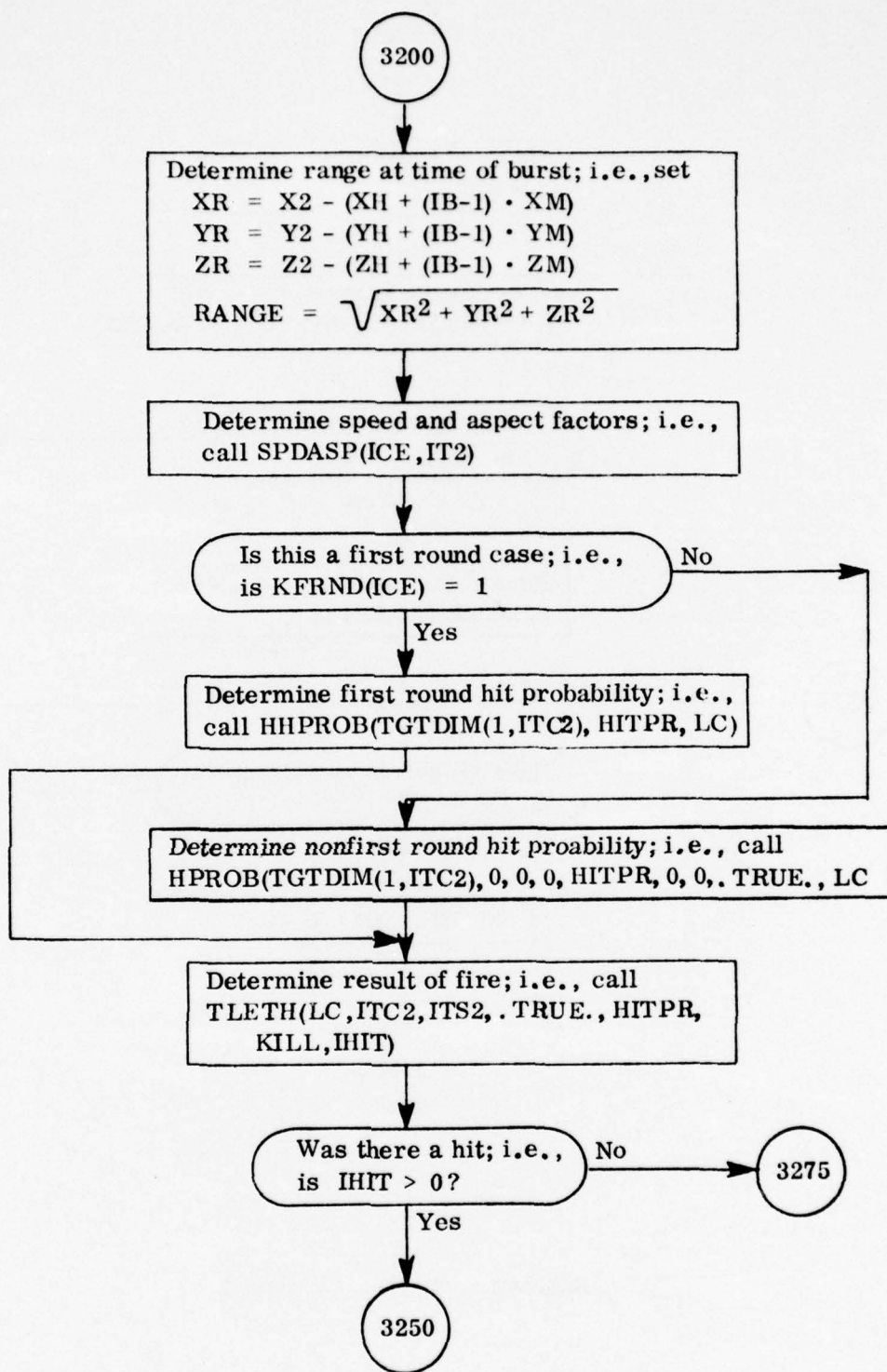


Subroutine HFIRE: Continued
B-443



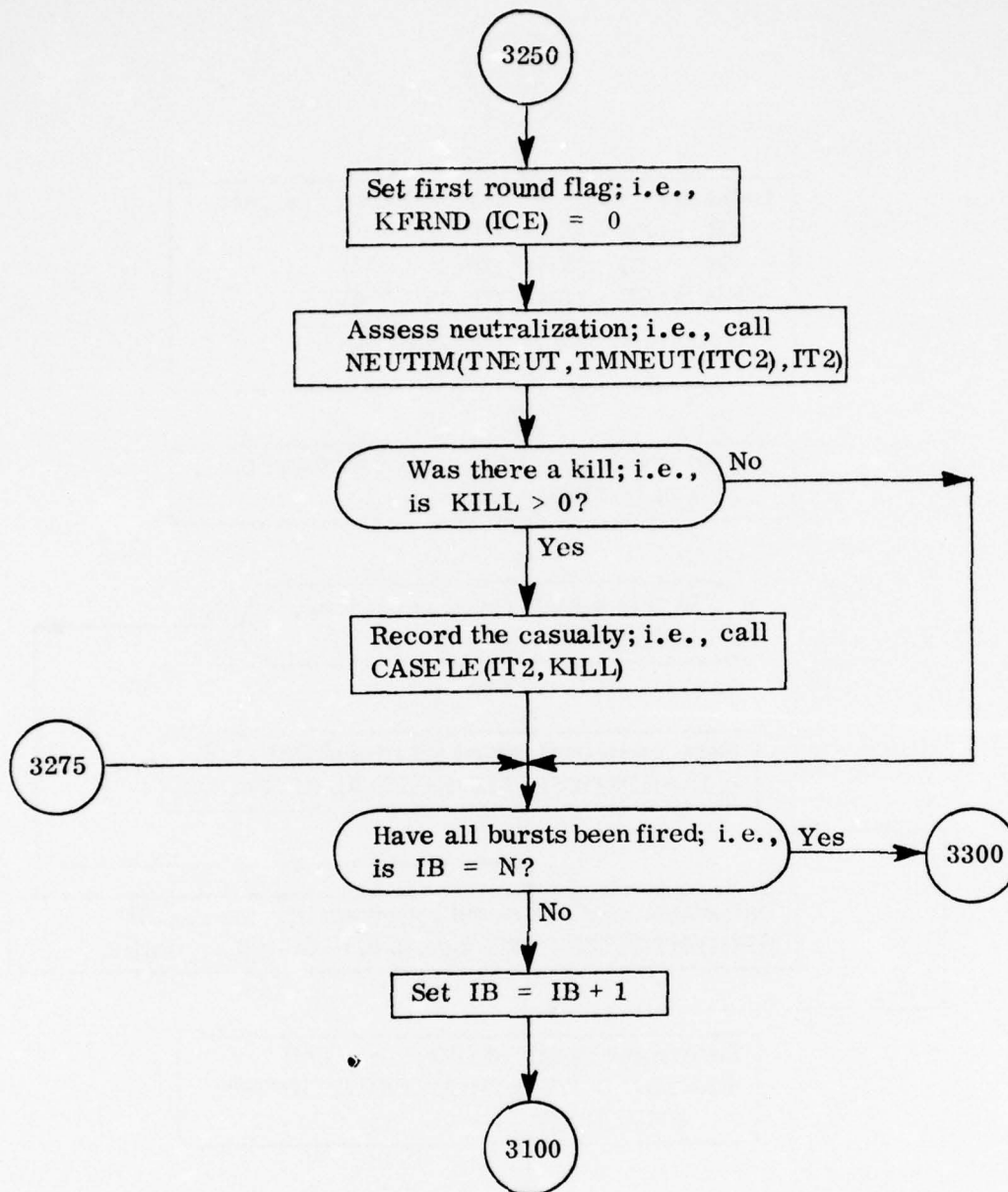
Subroutine HFIRE: Continued

B-444

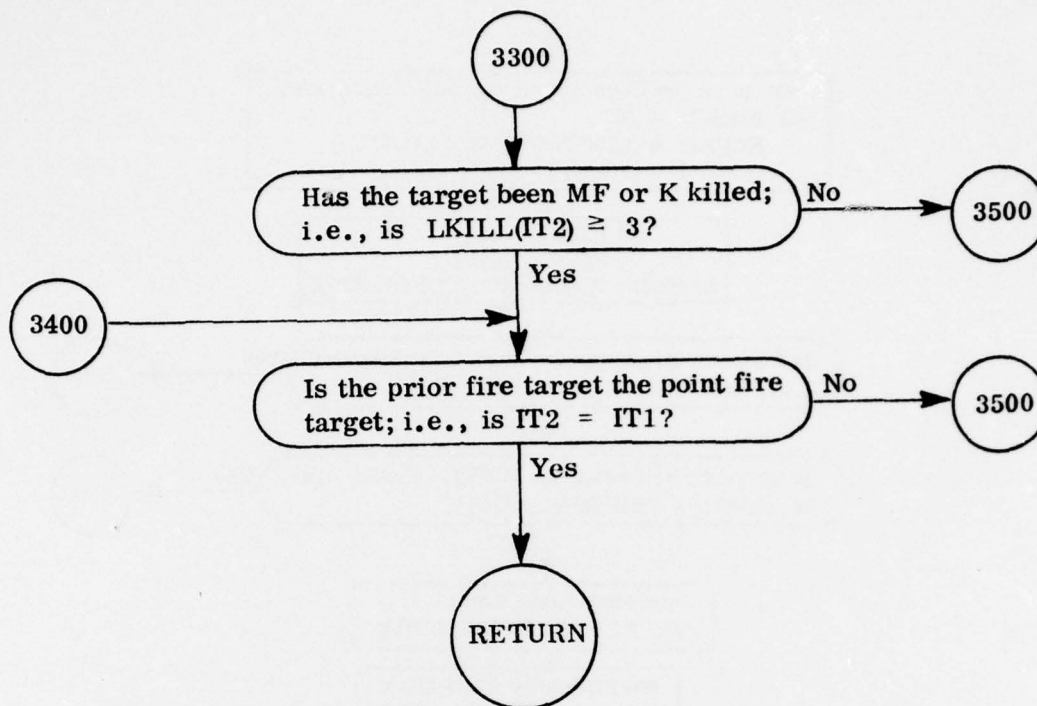


Subroutine HFIRE: Continued

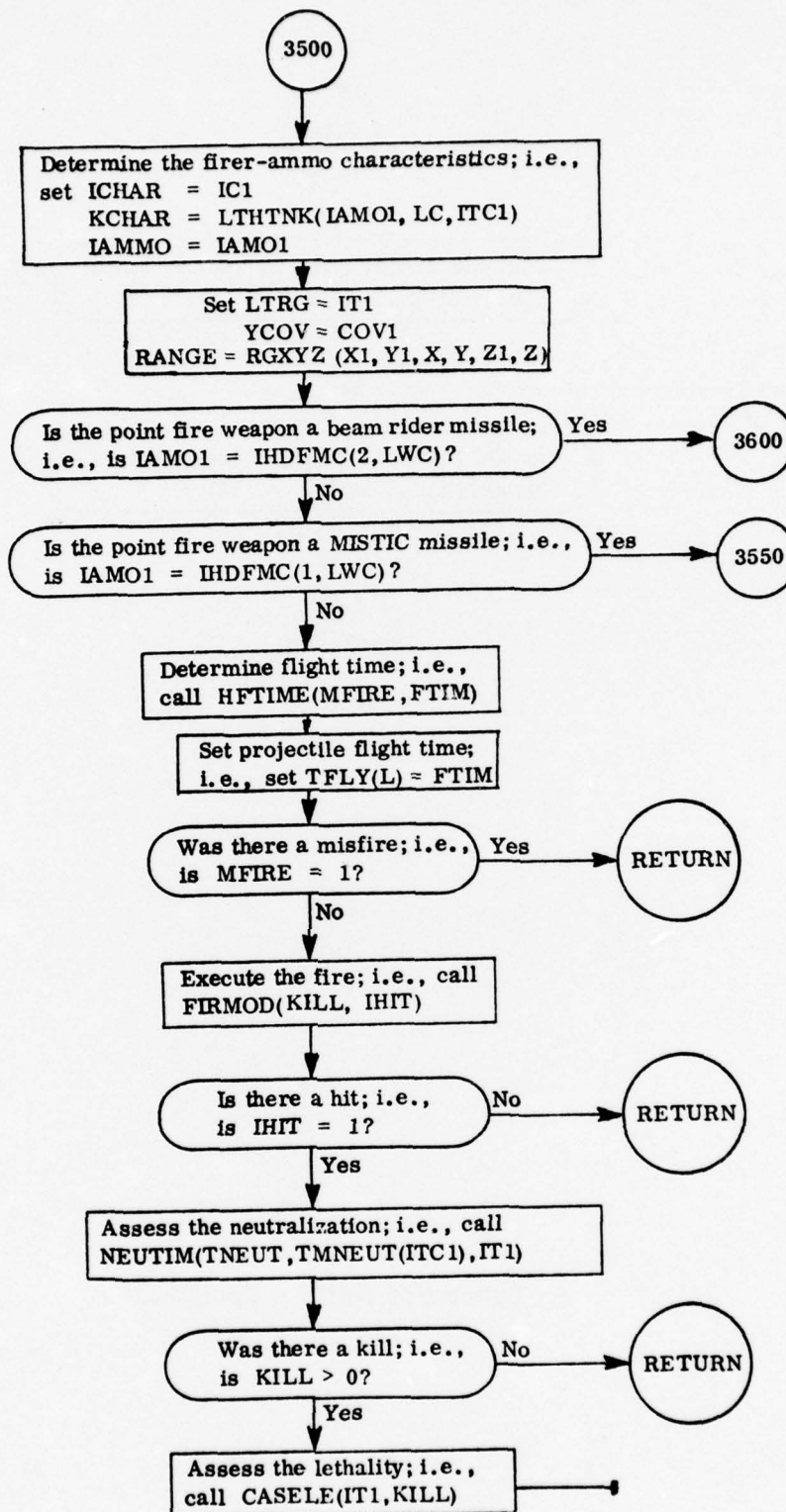
B-445



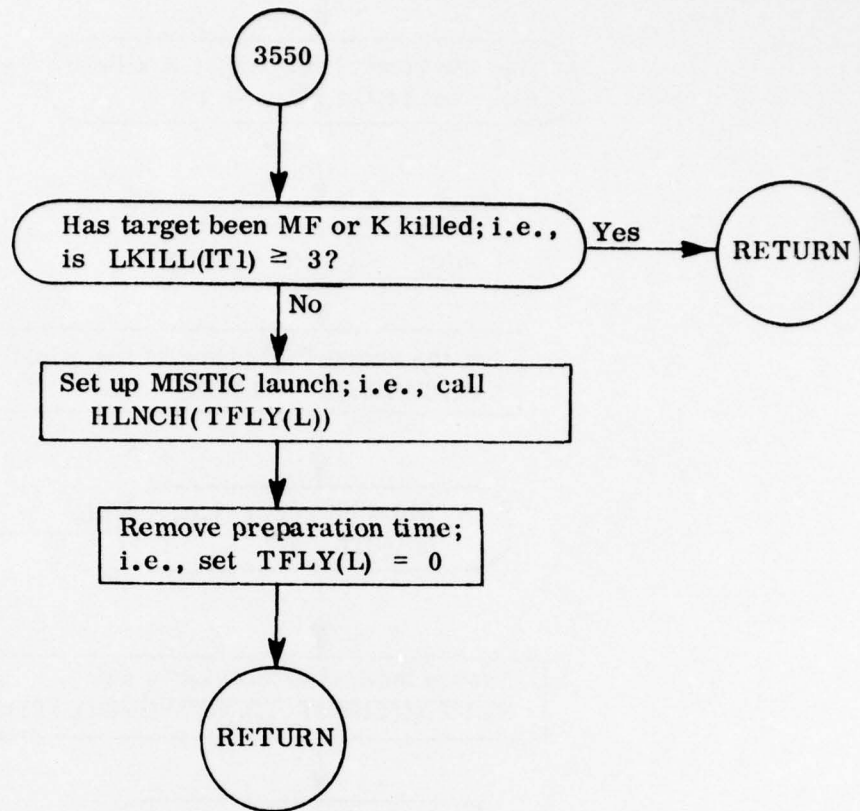
Subroutine HFIRE: Continued



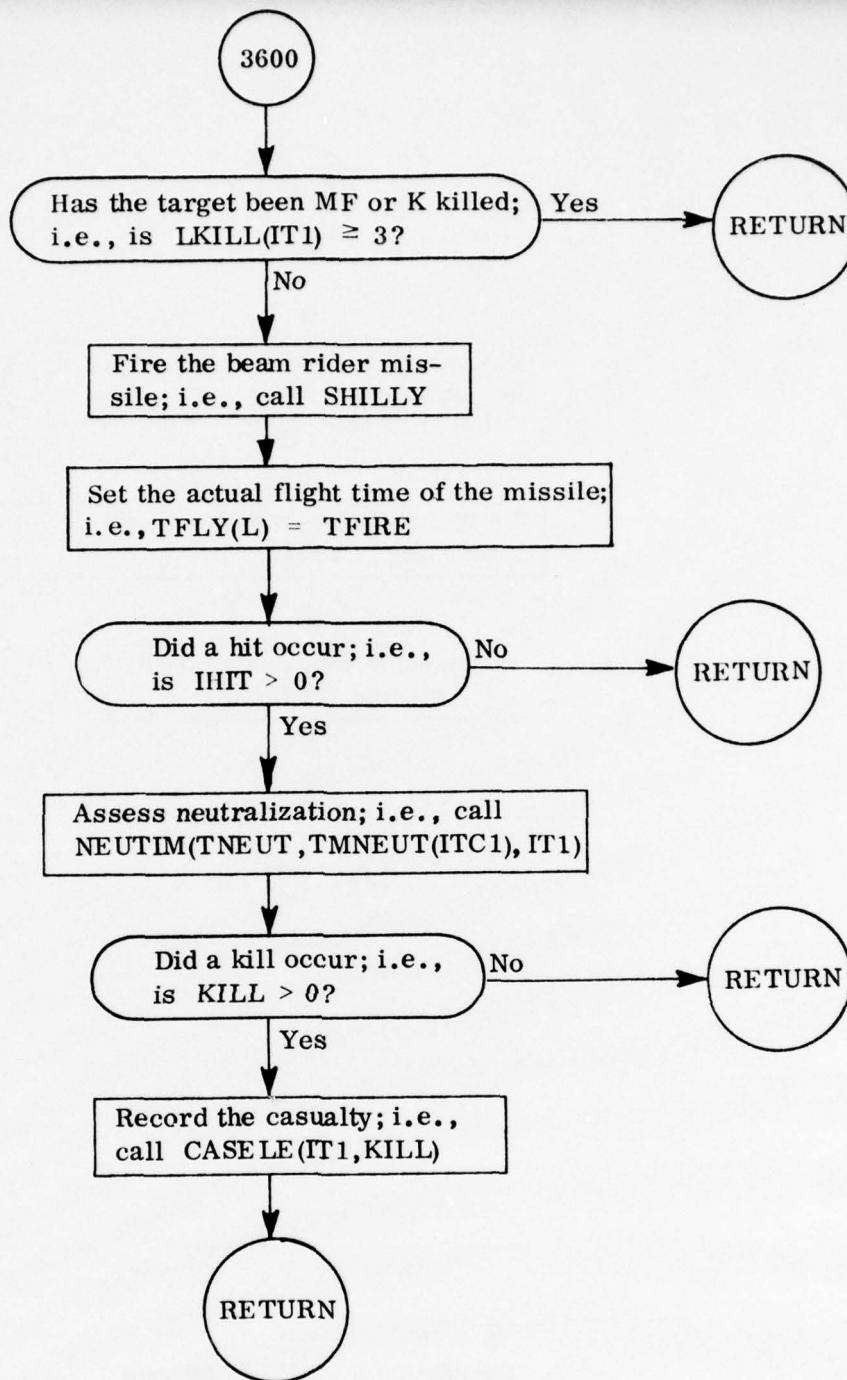
Subroutine HFIRE: Continued



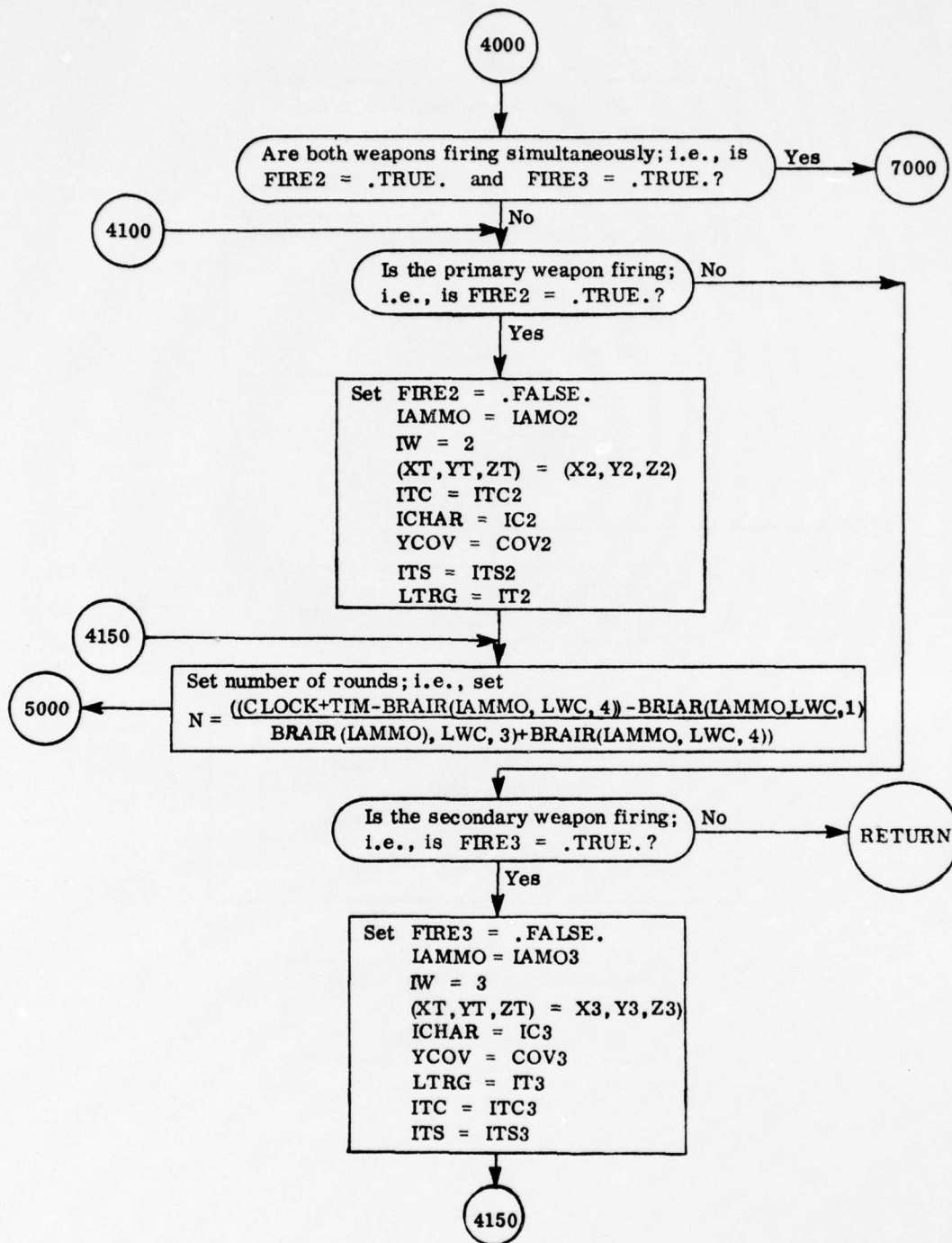
Subroutine HFIRE: Continued



Subroutine HFIRE: Continued

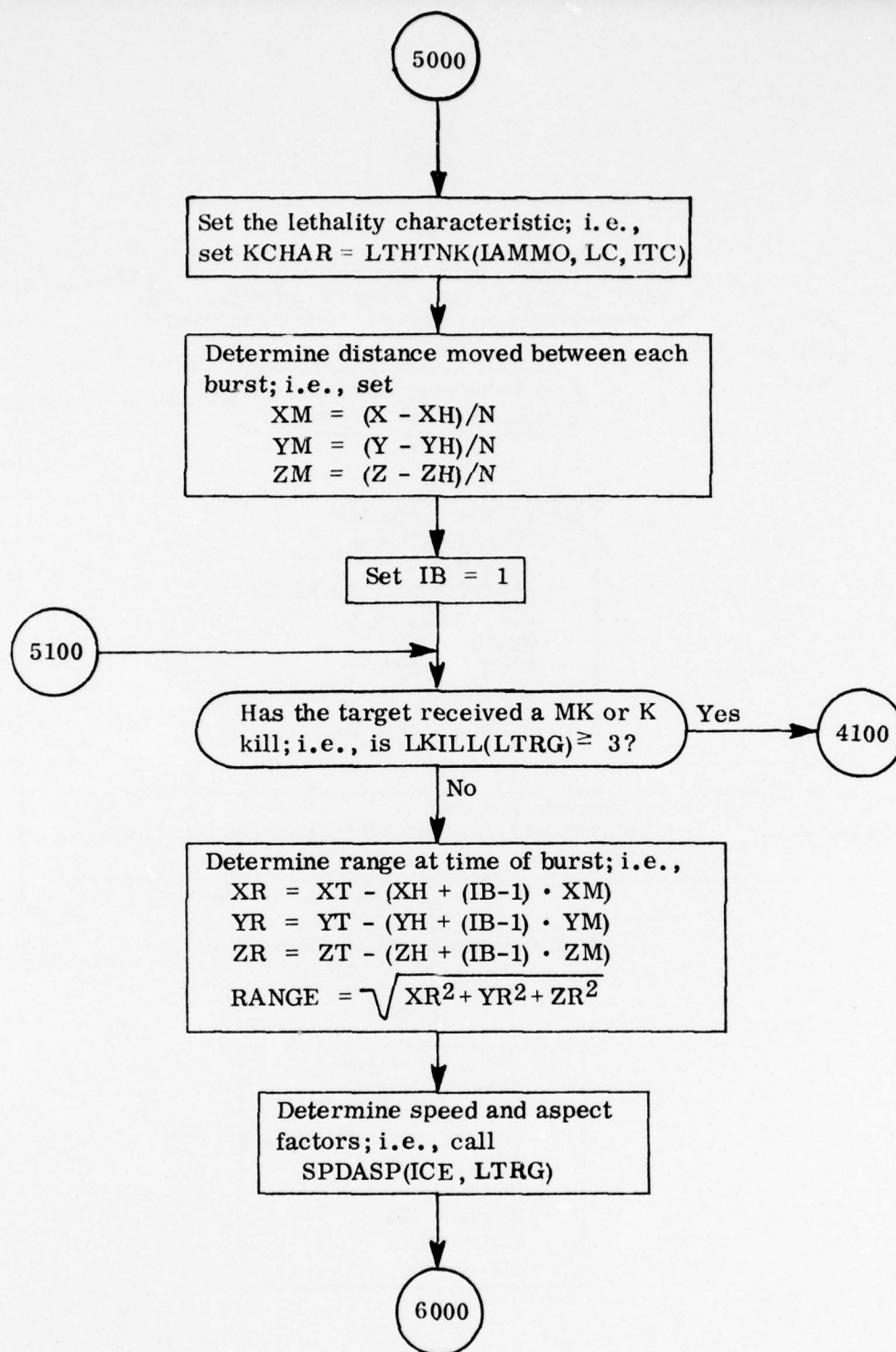


Subroutine HFIRE: Continued

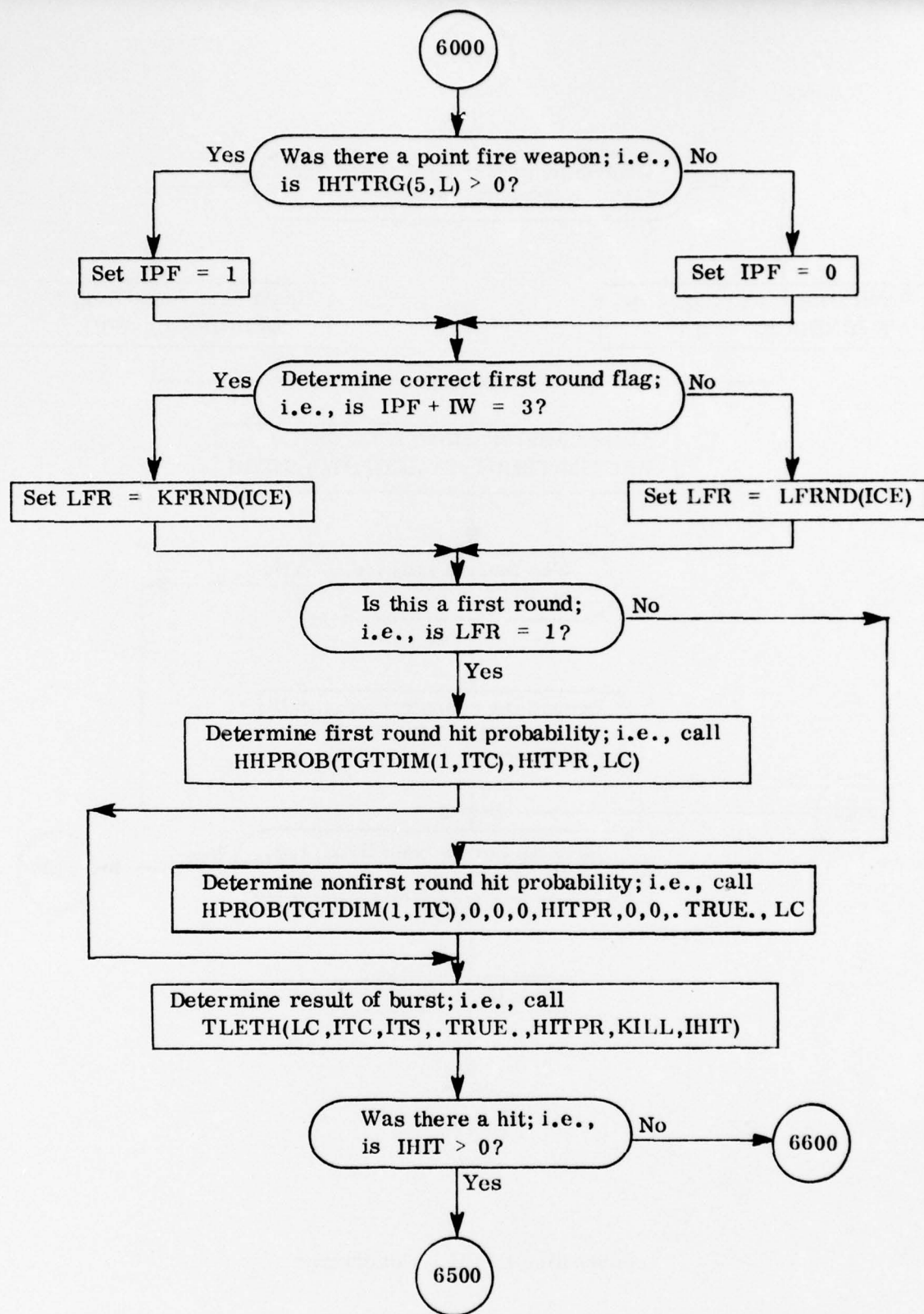


Subroutine HFIRE: Continued

B-451

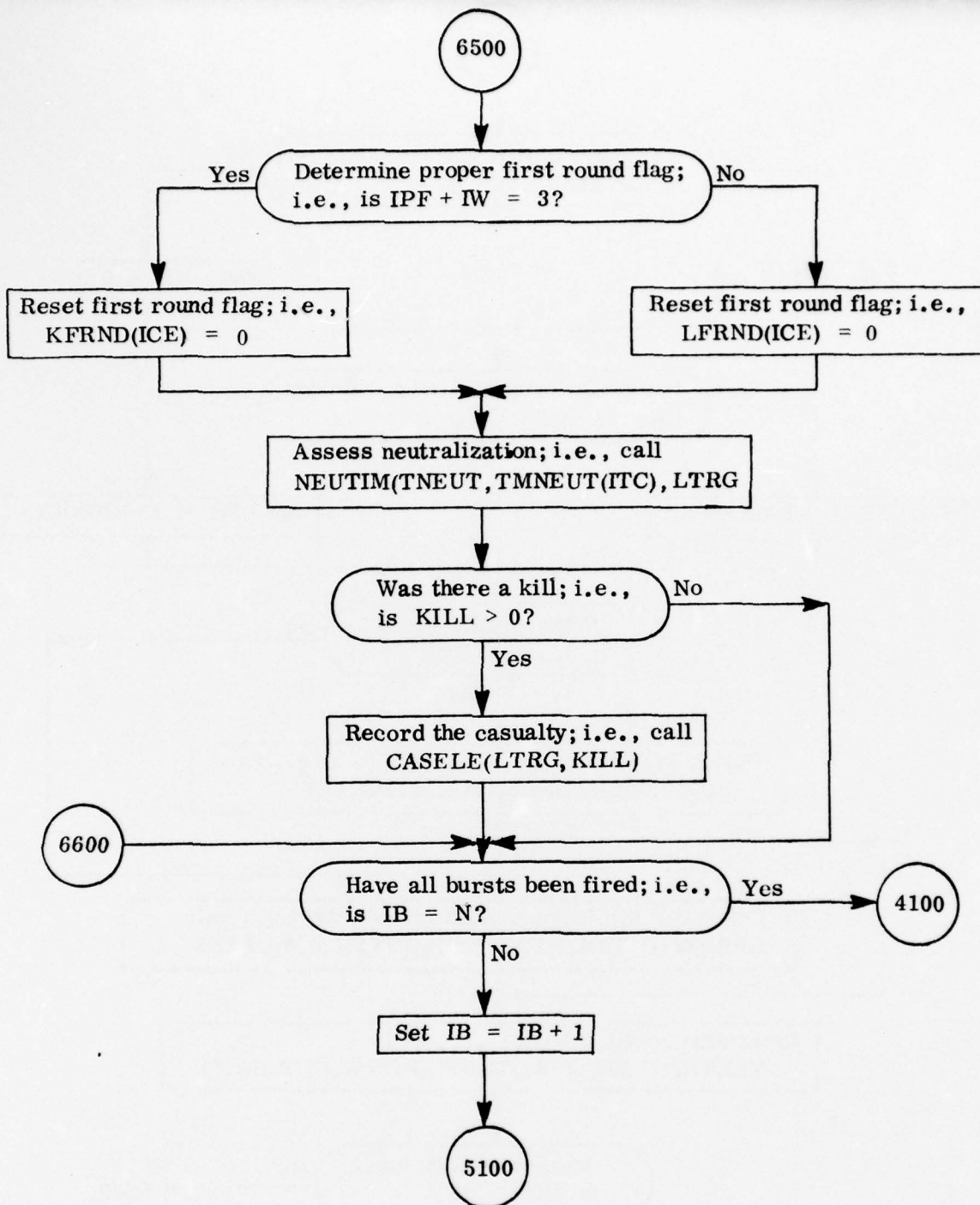


Subroutine HFIRE: Continued

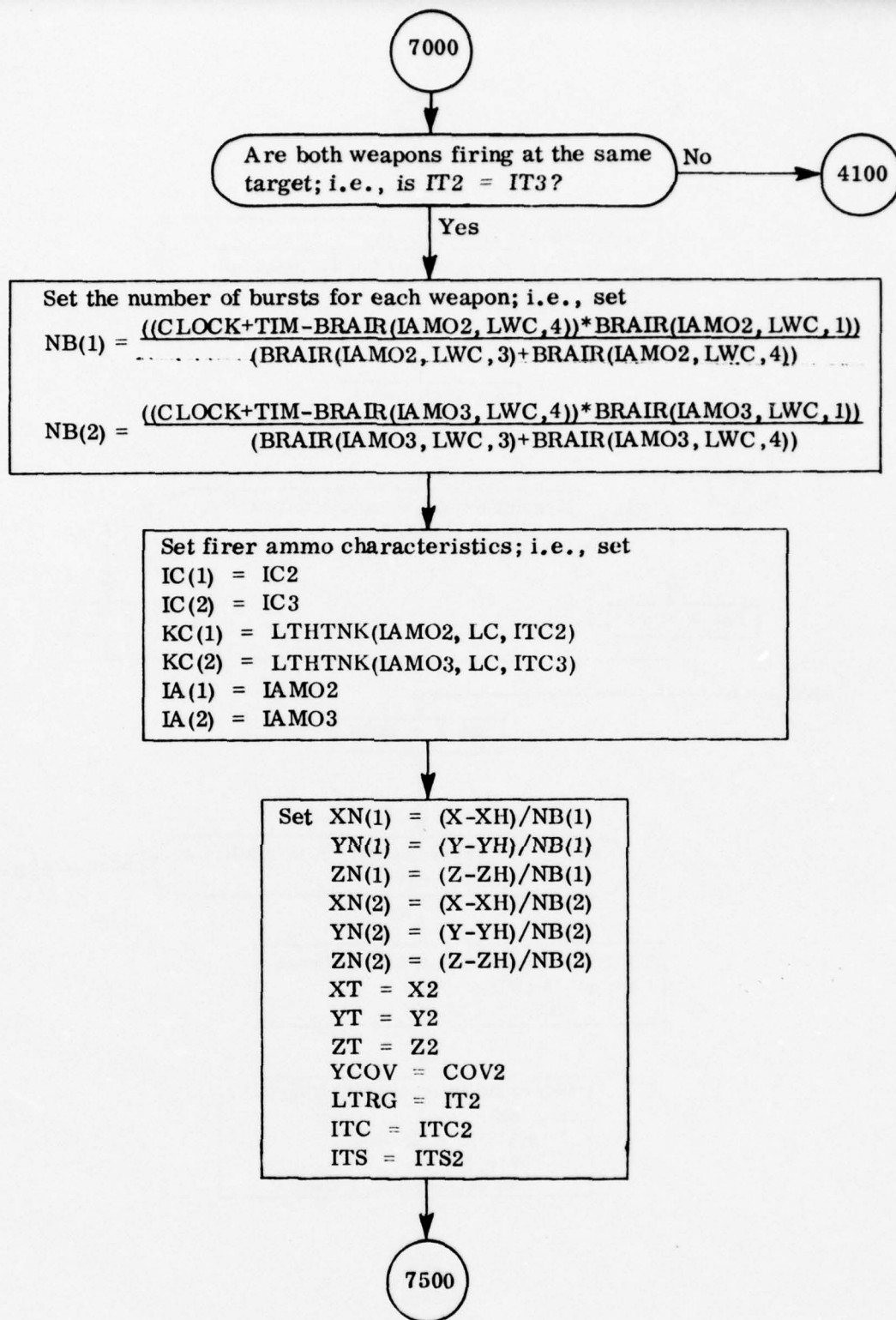


Subroutine HFIRE: Continued

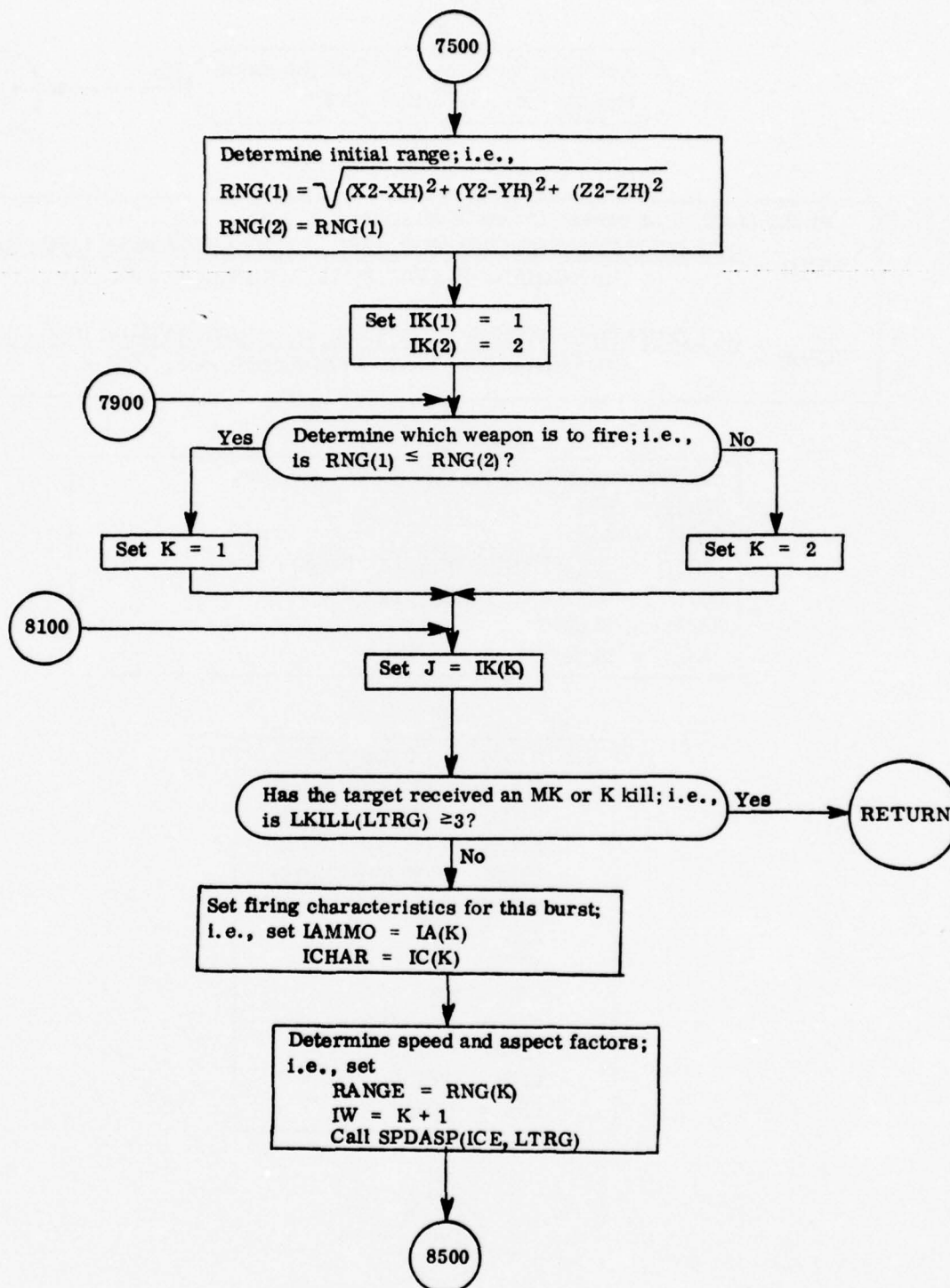
B-453



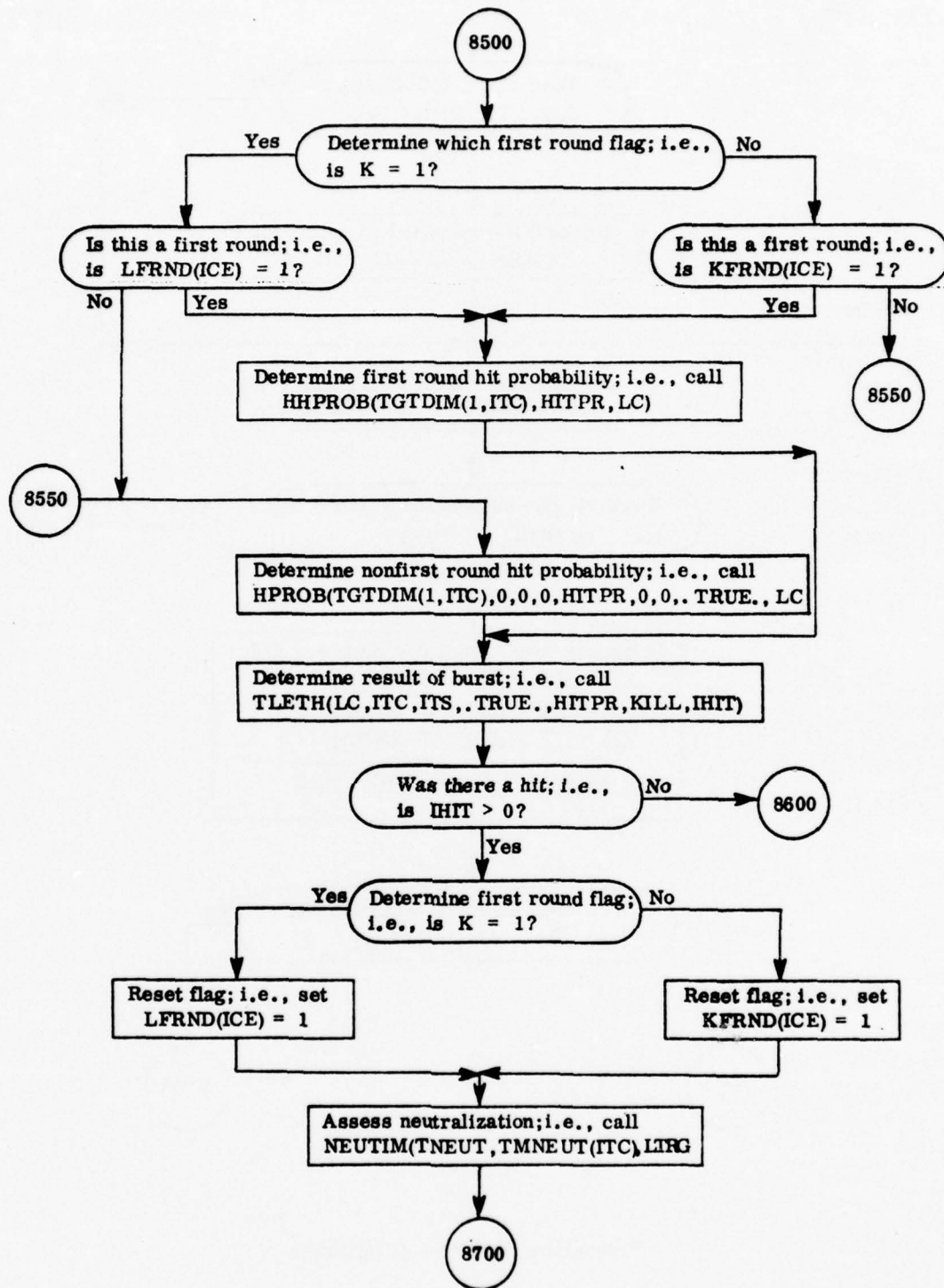
Subroutine HFIRE: Continued



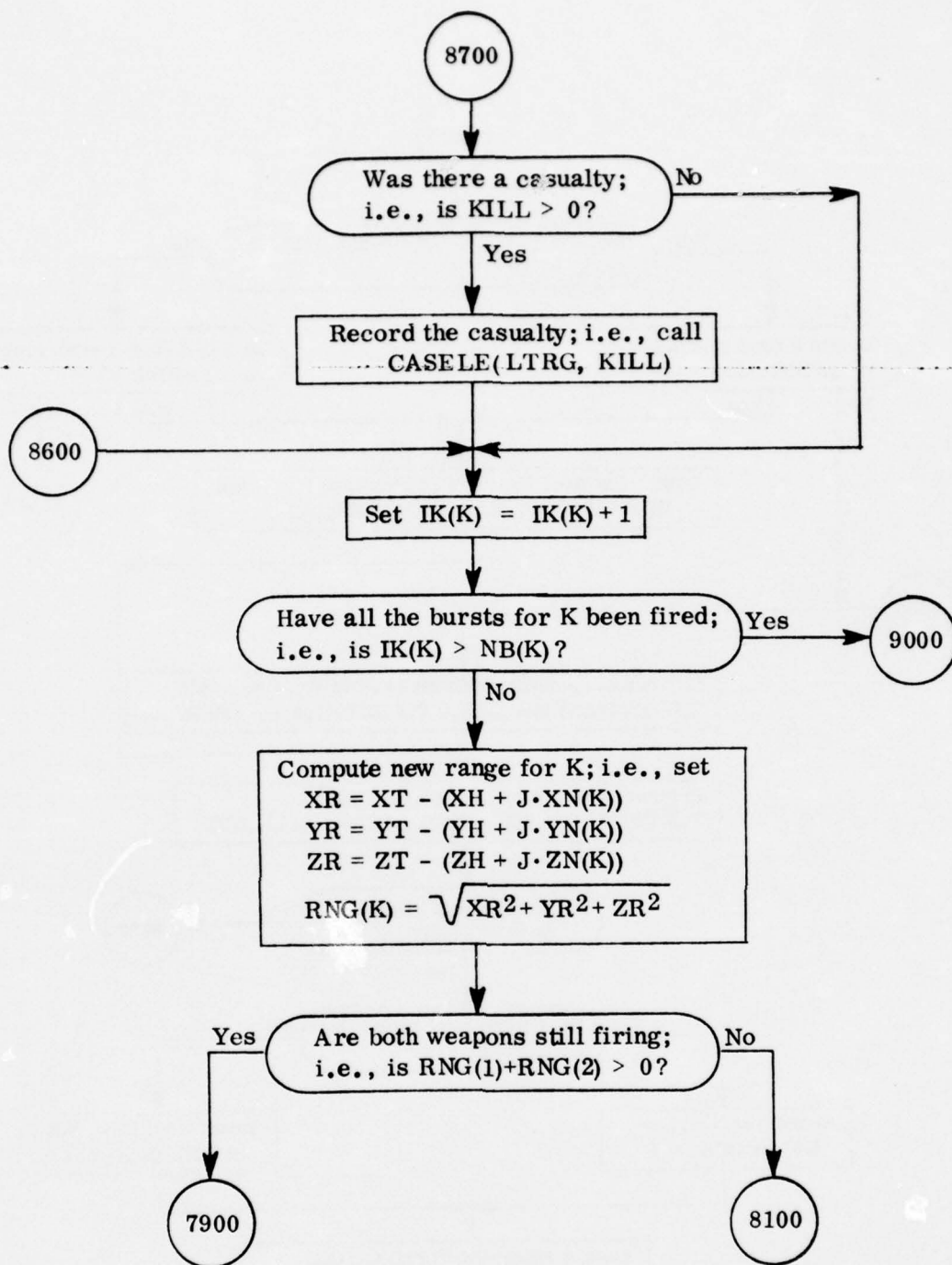
Subroutine HFIRE: Continued



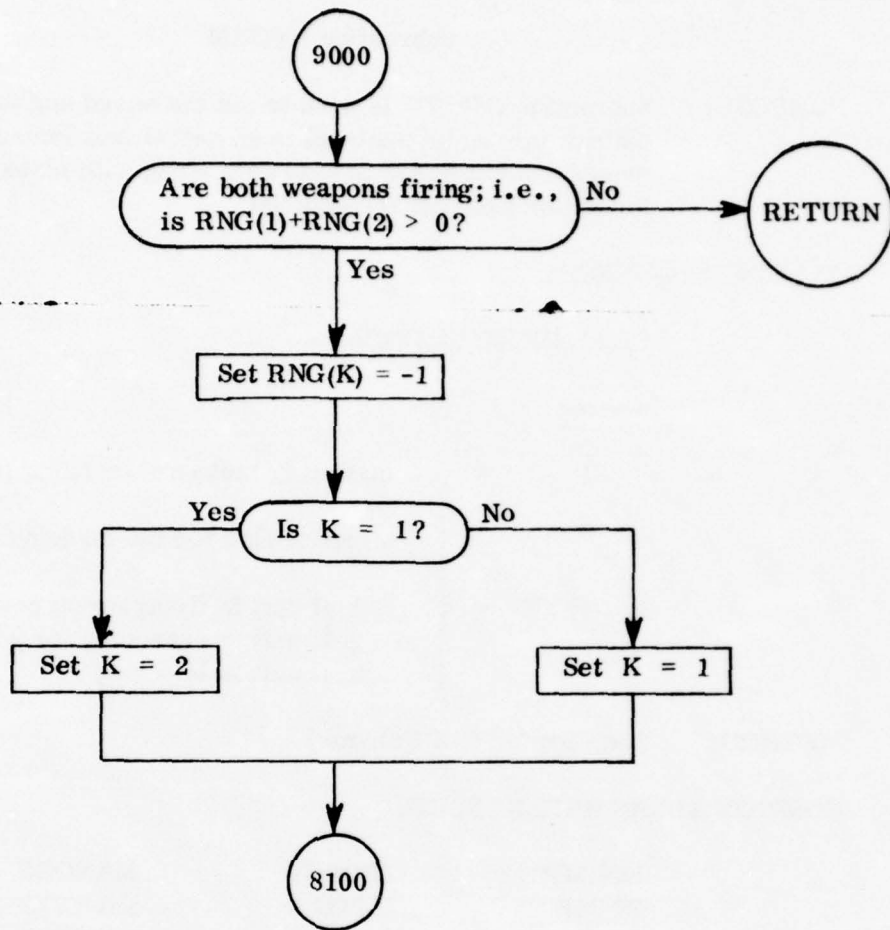
Subroutine HFIRE: Continued
B-456



Subroutine HFIRE: Continued
B-457



Subroutine HFIRE: Continued



Subroutine HFIRE: Continued

Subroutine HFORM

PURPOSE: Subroutine HFORM is used to set the speed and formation pattern for aerial sections in an aerial unit formation. The maneuver unit speed is also set, along with platoon and team formation patterns if required.

CALLING SEQUENCE:

CALL HFORM(I,IFTN)

where:

| | | |
|------|---|--|
| I | = | maneuver unit number being processed |
| IFTN | = | { situation flag for the maneuver unit |
| | | 1 if unit is flying cross country |
| | | 2 if unit is searching for a target |
| | | 3 if unit is loitering |

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| FORMPT | IPORG | MANORG |
| FORMSE | ISPOS | MANTYP |
| FORMTE | ITORG | NAVSEC |
| HFORMS | JPHASE | NUMBER |
| HSPEED | LWCOD | SPDMU |
| IHFNA | MANHEL | SPDSE |

SUBROUTINES REQUIRED:

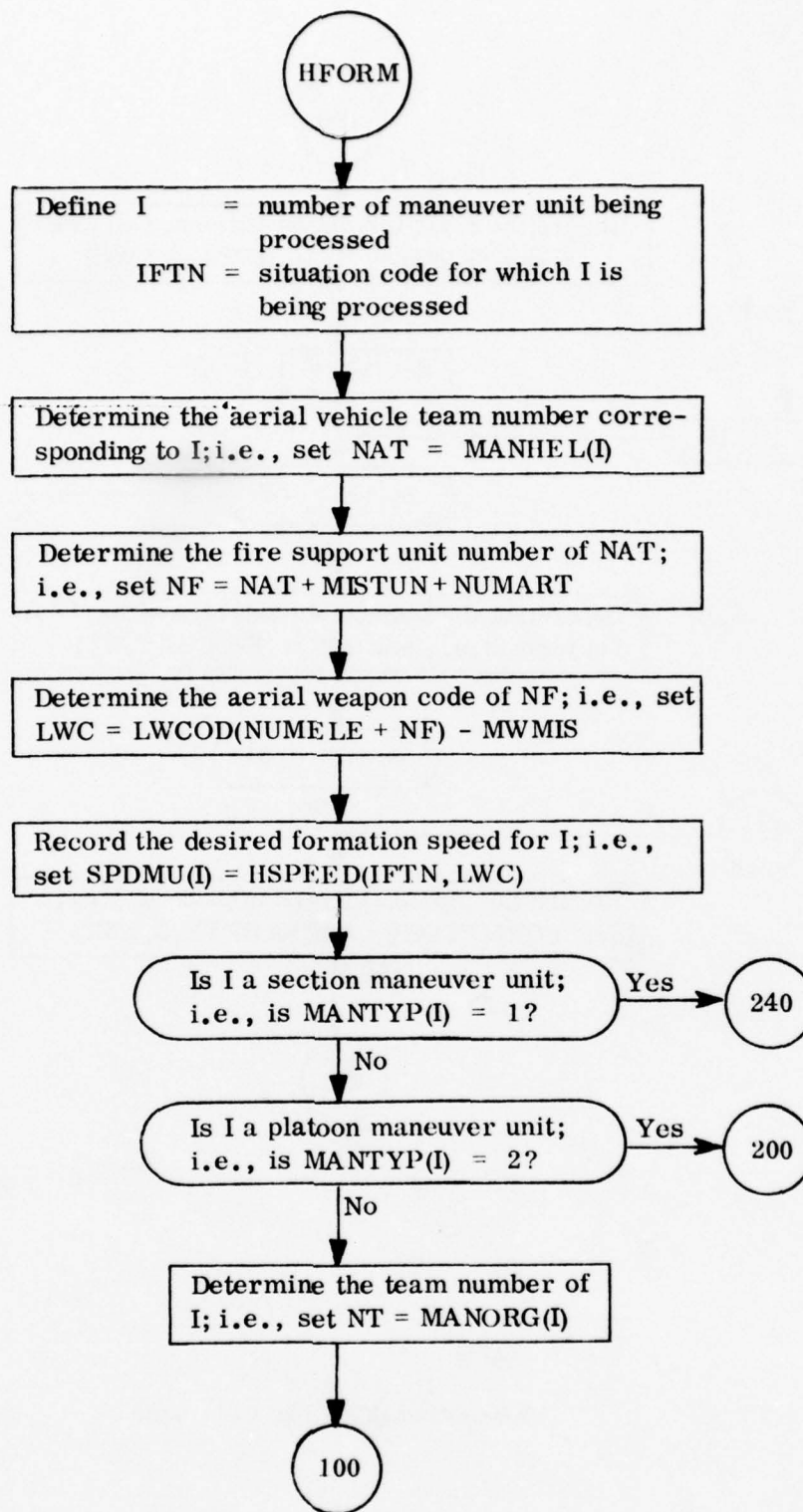
None

HFORM CALLED BY:

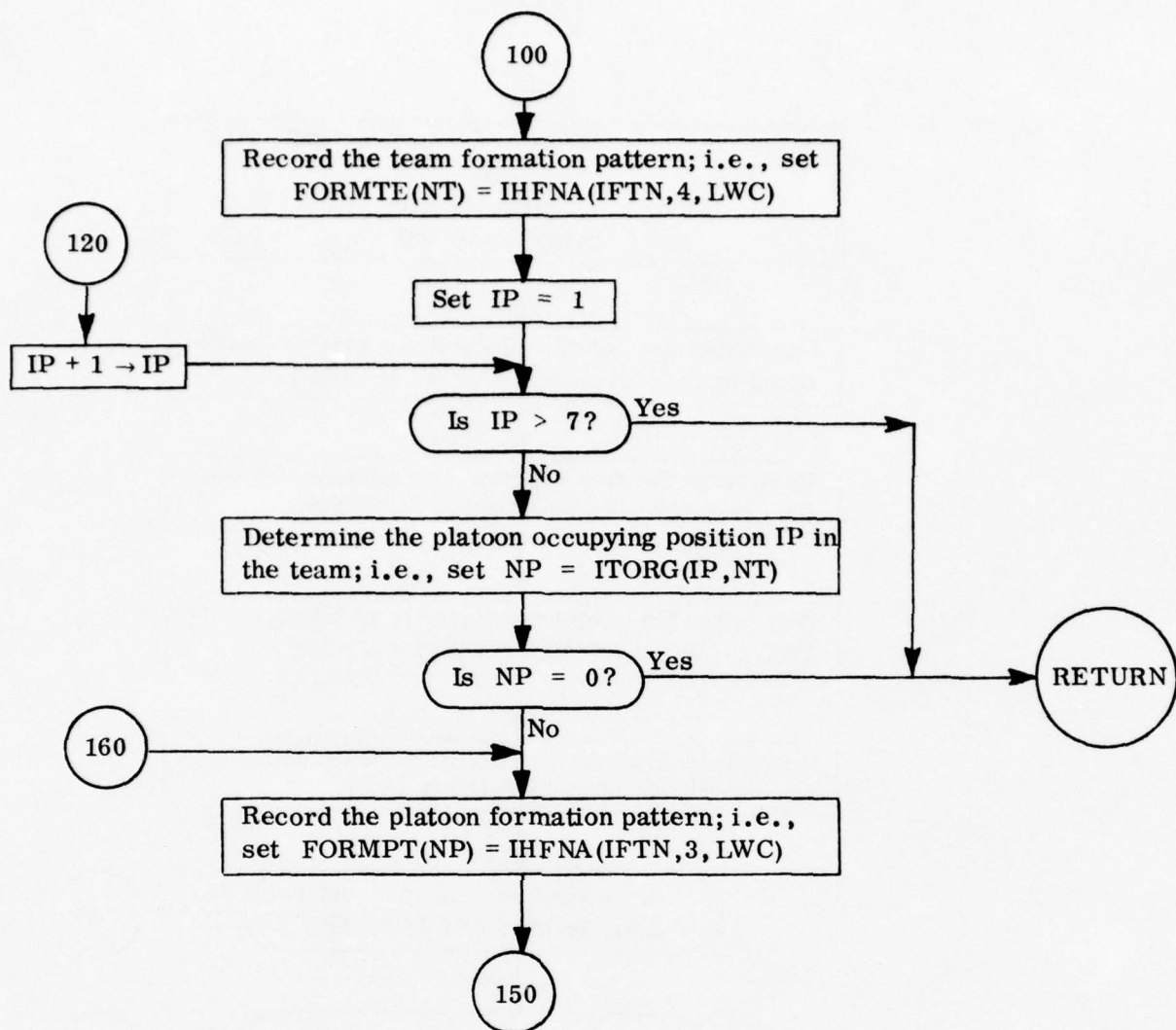
ATKPRM FLGSET HELCON HELFIR SECSET

STORAGE:

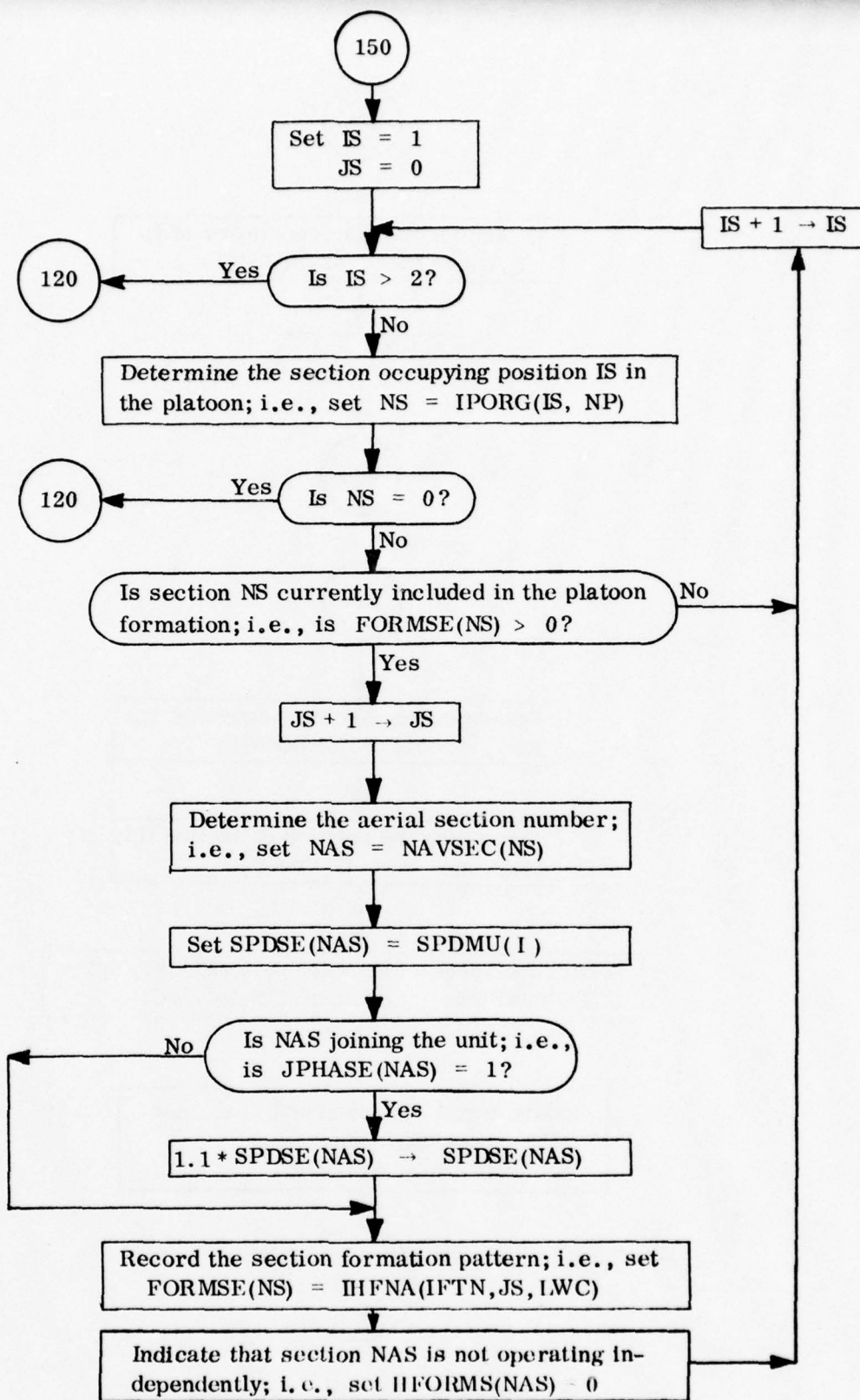
5DC₁₆ = 1502₁₀ BYTES



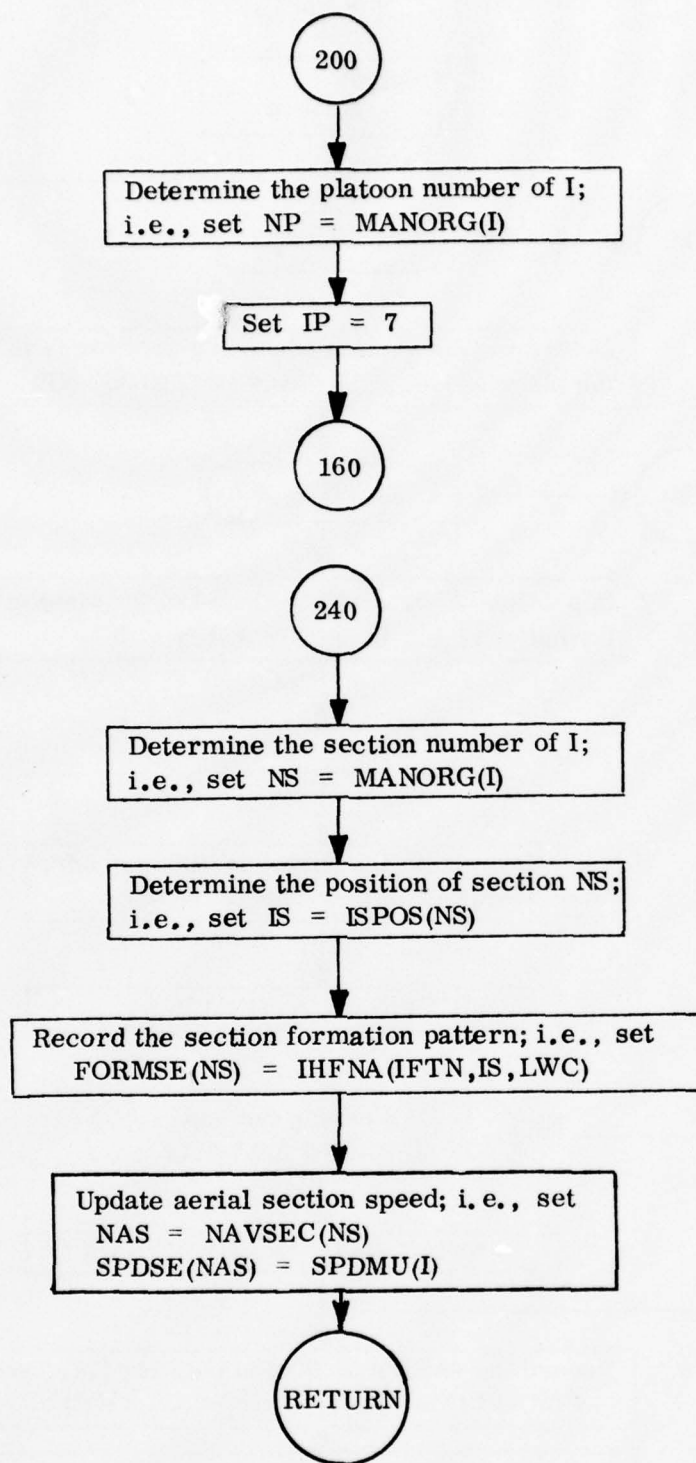
Subroutine HFORM: Formation Pattern Selection for an Aerial Unit



Subroutine HFORM: Continued



Subroutine HFORM: Continued



Subroutine HFORM: Continued

Subroutine HFTIME

PURPOSE: Subroutine HFTIME determines if there has been a misfire during an aerial vehicle point fire mission, and if not, computes the projectile flight time.

CALLING SEQUENCE:

CALL HFTIME(MFIRE,FTIM)

where

| | | | |
|-------|---|---|--------------------------|
| MFIRE | = | { | 1 misfire occurred |
| | | | 0 no misfire occurred |
| FTIM | = | { | flight time - no misfire |
| | | | 0 misfire |

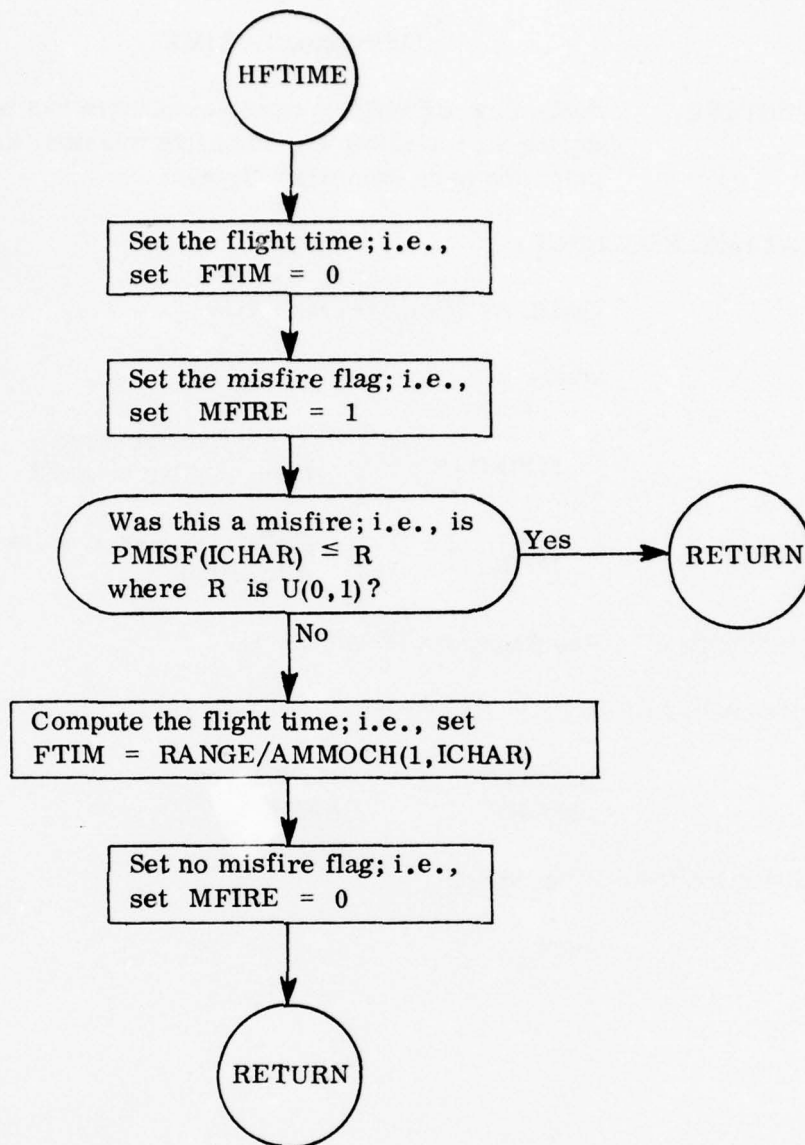
METHOD: See Chapter 8 of Volume 1.

COMMON AREAS REFERENCED:

| | |
|--------|-------|
| AMMOCH | PMISF |
| IAMMO | RANGE |

SUBROUTINES REQUIRED:

None



Subroutine HFTIME: Helicopter Weapon Projectile Flight Time

Subroutine HHPROB

PURPOSE: Subroutine HHPROB determines the first round case hit probability for an aerial vehicle rapid fire burst.

CALLING SEQUENCE:

CALL HHPROB(TGTDIM(1,ITWCOD),HITPR,LC)

where

TGTDIM(1,ITWCOD) is the target dimension array
for the target weapon system of type ITWCOD

HITPR = the returned hit probability

LC = the weapon code of the firer.

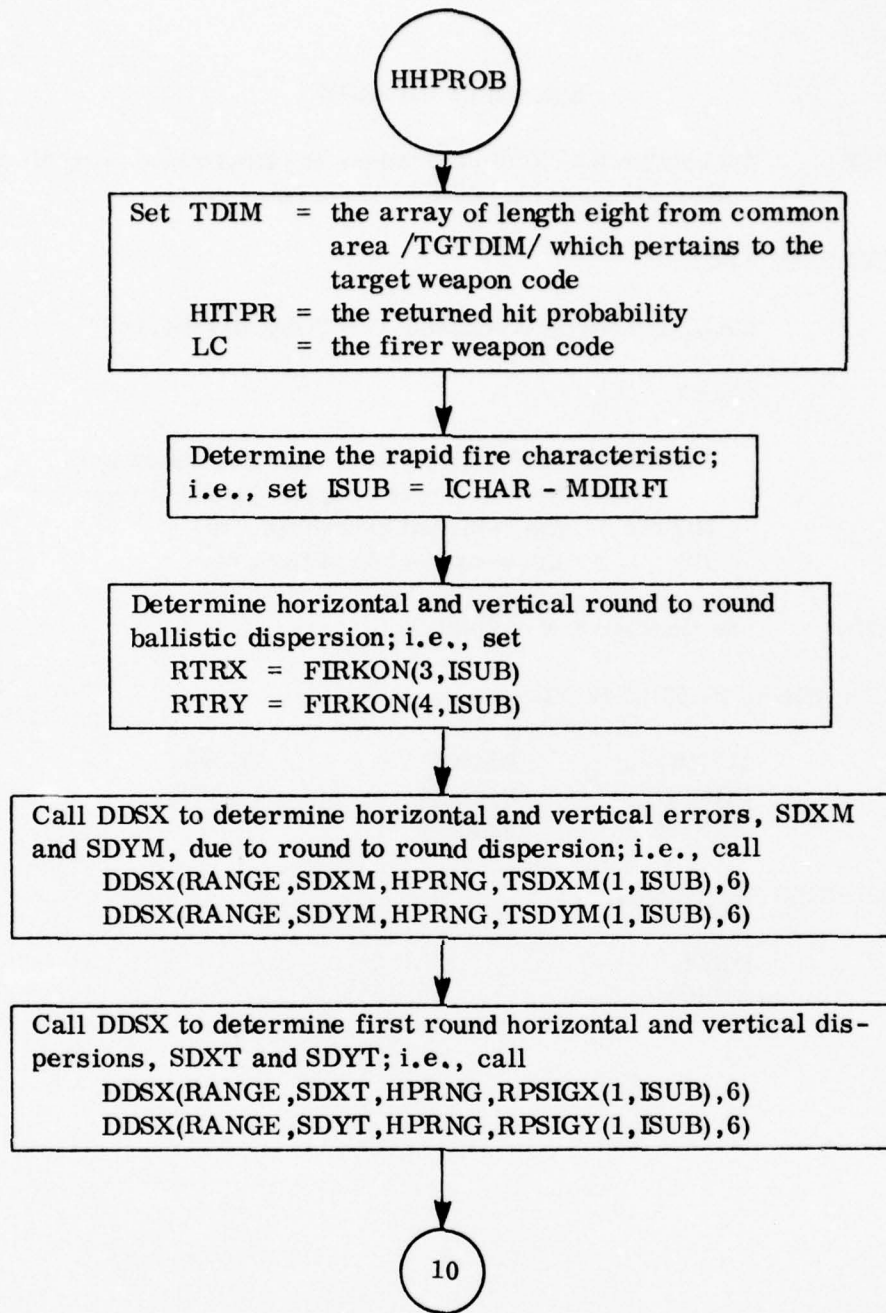
METHOD: See Chapter 8 of Volume 1.

COMMON AREAS REFERENCED:

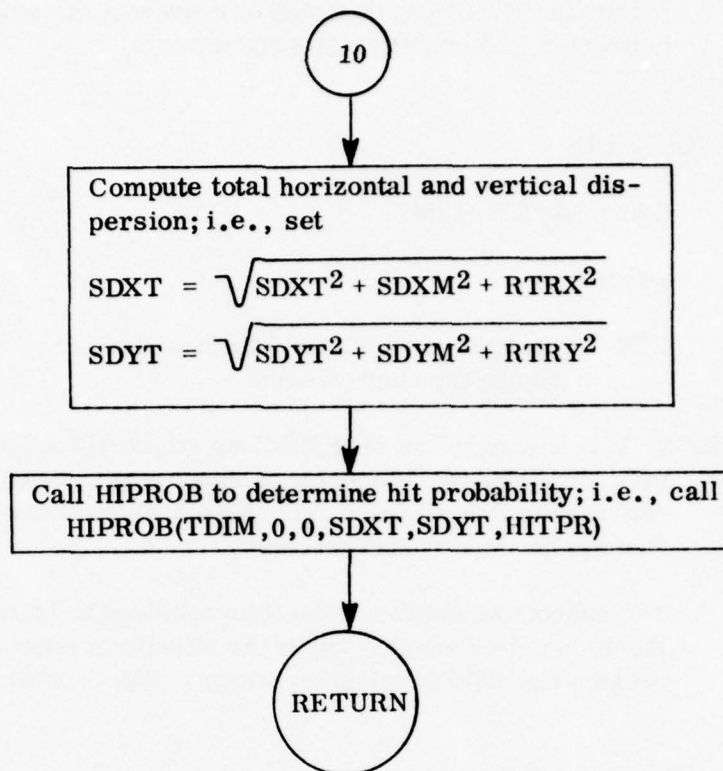
| | | |
|--------|--------|-------|
| IAMMO | RANGE | TSDXM |
| FIRKON | RPSIGX | TSDYM |
| MAXWEP | RPSIGY | |

SUBROUTINES REQUIRED:

DDSX
HIPROB



Subroutine HHPROB: Helicopter Weapon Hit Probabilities



Subroutine HHPROB: Continued

Subroutine HLNCH

PURPOSE: Subroutine HLNCH is designed to represent the activities of a helicopter in launching a MISTIC missile.

CALLING SEQUENCE:

CALL HLNCH (TIM)

where

TIM = the time at which the launch is desired
during the current event

RESTRICTIONS: It is assumed that all conditions required for the launch are met. That is, the helicopter is in a firing position, the helicopter is to fire a MISTIC missile and at least one MISTIC round remains in the ammunition supply.

METHOD: The subroutine computes the time required to launch, decrements the ammunition supply, and if the missile is successfully launched, creates the MISTIC missile element. See Chapter 8 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| ICECOM | LNUM | OPEN |
| IHDFMC | MANHEL | PHNG |
| IUNACT | MDFAF | TDFRDY |
| KFO | MIDATA | TIFRDY |
| LFLAG | MOBVH | |
| LNSET | NUMBER | |

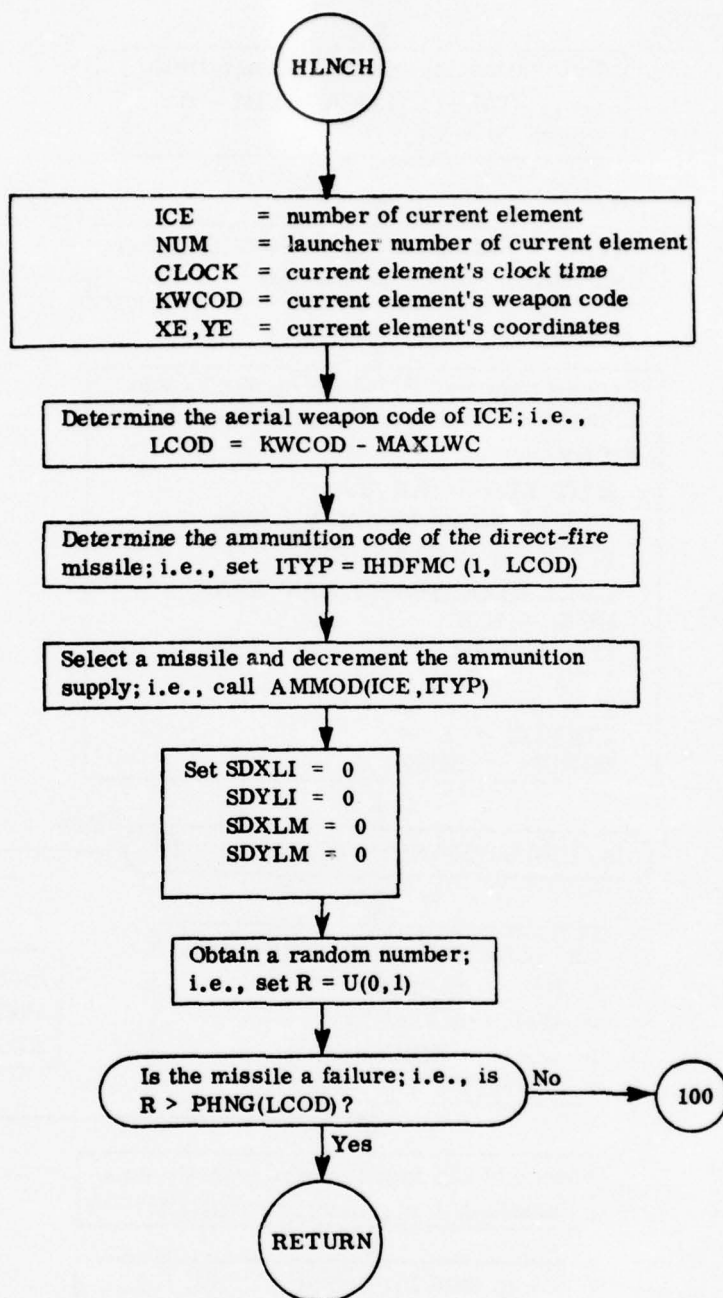
SUBROUTINES REQUIRED:

| | |
|--------|--------|
| AMMOD | FRANUD |
| CREATM | LNBFLT |
| ELOC | MICONP |
| ELVATE | |

HLNCH CALLED BY:

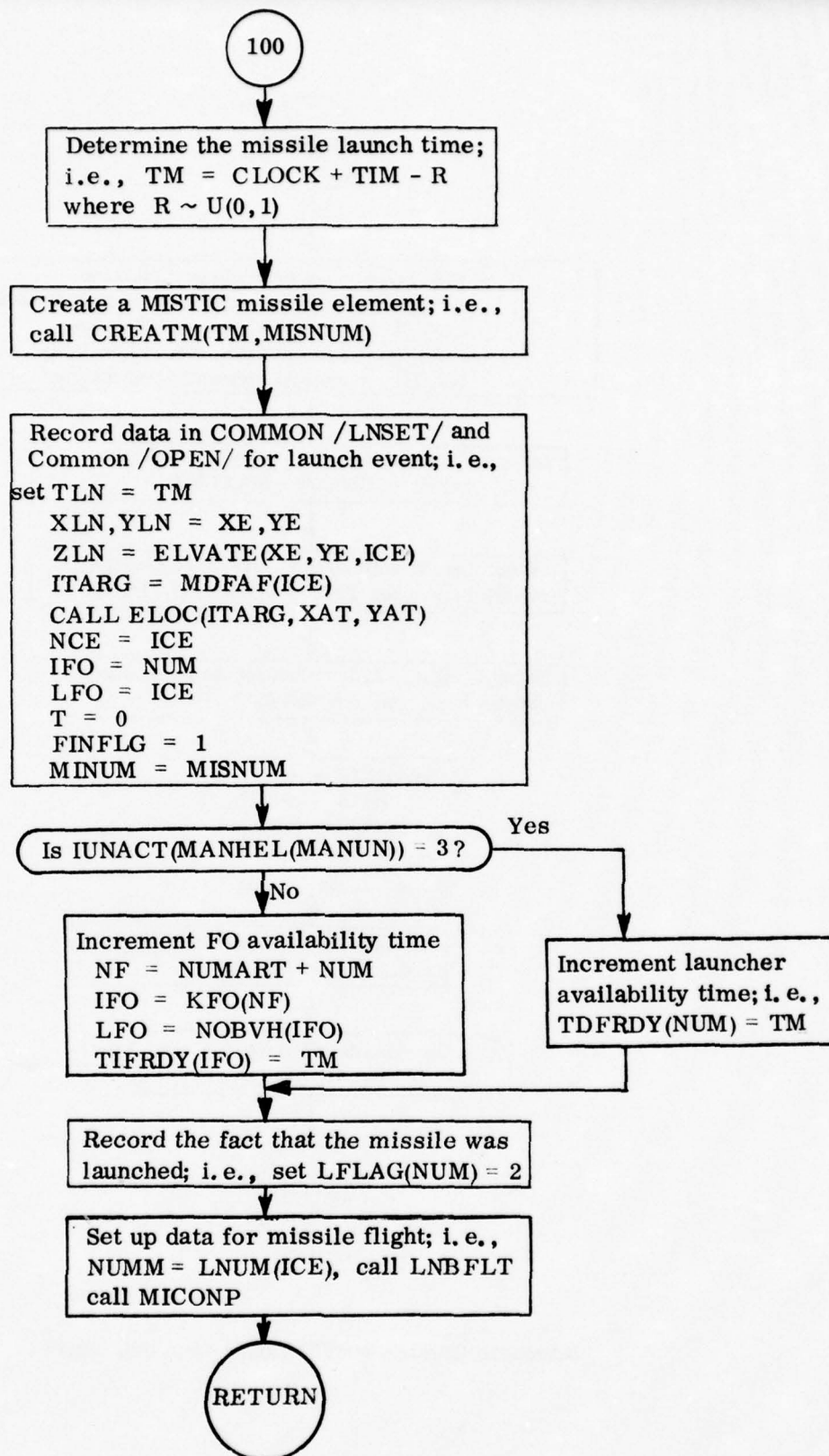
HFIRE

LENGTH: $400_{16} = 1024_{10}$ bytes



Subroutine HLNCH: MISTIC Launch from Helicopters

B-471



Subroutine HLNCH: Continued

Subroutine HPROB

PURPOSE: Subroutine HPROB determines the accuracy parameters for main tank gun and rapid fire rounds and uses HIPROB to determine a hit probability.

CALLING SEQUENCE:

CALL HPROB(AREA, KPNPT, VMZP, KSTAT, HITPR, SDXT,
SDYT, LAMMO, IFWC)

where

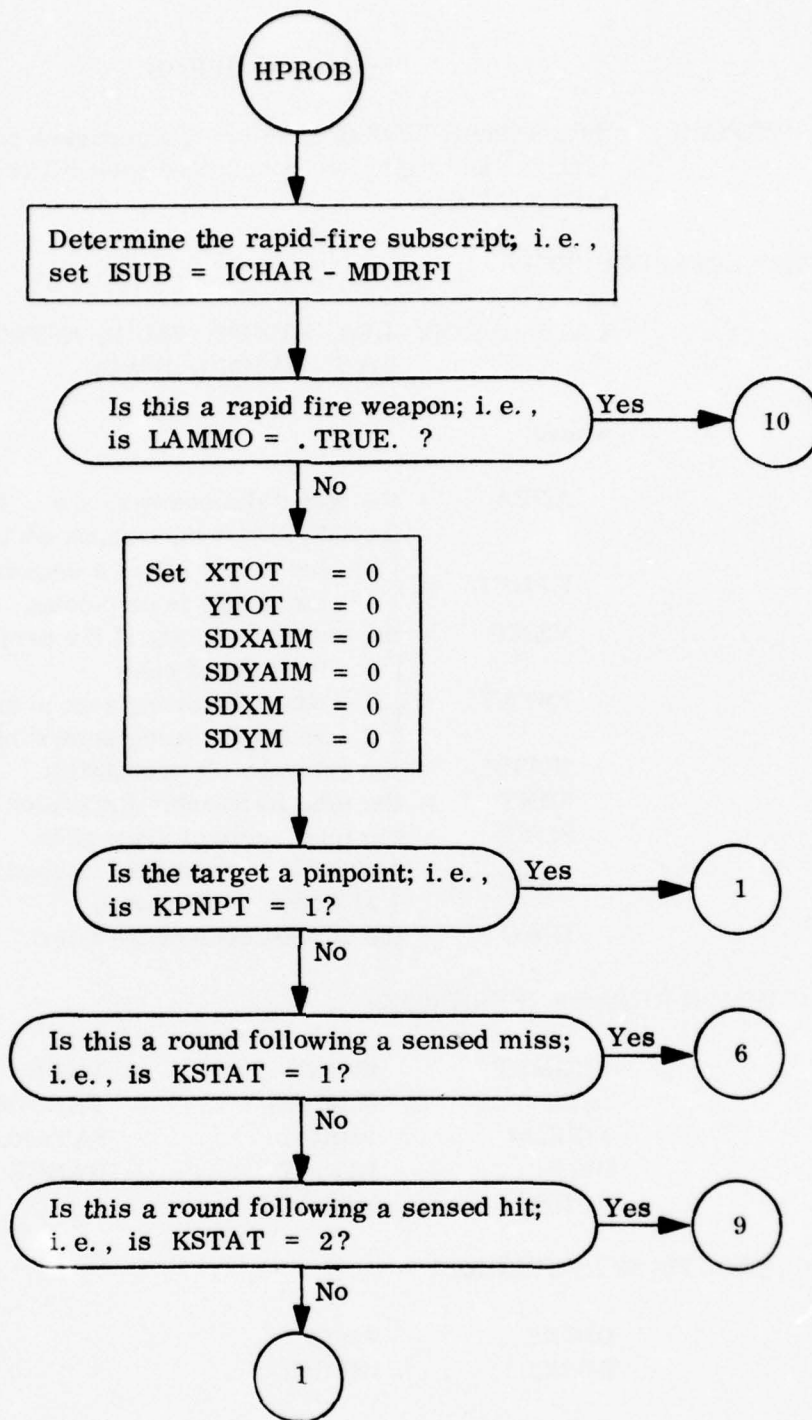
AREA = the target dimensions, i. e. , TGTDIM(1, ITWCOD)
for ITWCOD = the weapon code of the target
KPNPT = $\begin{cases} 0 - \text{the target is not a pinpoint} \\ 1 - \text{the target is pinpointed} \end{cases}$
VMZP = the muzzle velocity of the projectile
KSTAT = $\begin{cases} 0 - \text{first round case} \\ 1 - \text{round following sensed miss} \\ 2 - \text{round following sensed hit} \end{cases}$
HITPR = the returned hit probability
SDXT = the total horizontal dispersion
SDYT = the total vertical dispersion
LAMMO = $\begin{cases} . \text{TRUE.} - \text{rapid fire weapon} \\ . \text{FALSE.} - \text{otherwise} \end{cases}$
IFWC = the weapon code of the firer

COMMON AREAS REFERENCED:

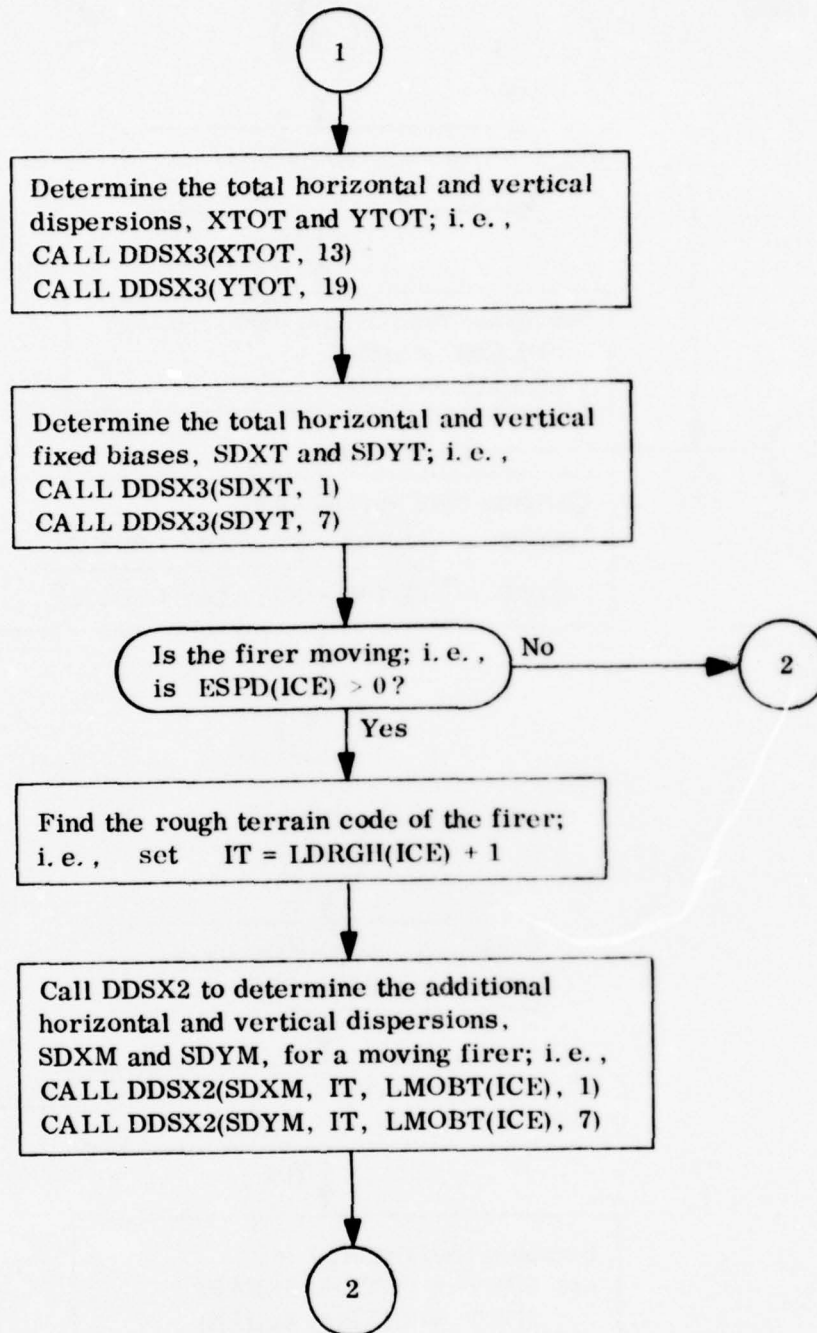
| | | |
|--------|--------|--------|
| ENGMET | IAMMO | PKPB |
| ESPD | ICECOM | PNPTBS |
| FIRKON | LDRGH | SATARG |
| HITP | LMOBT | RANGE |
| HPRNG | MAXWEP | |

SUBROUTINES REQUIRED:

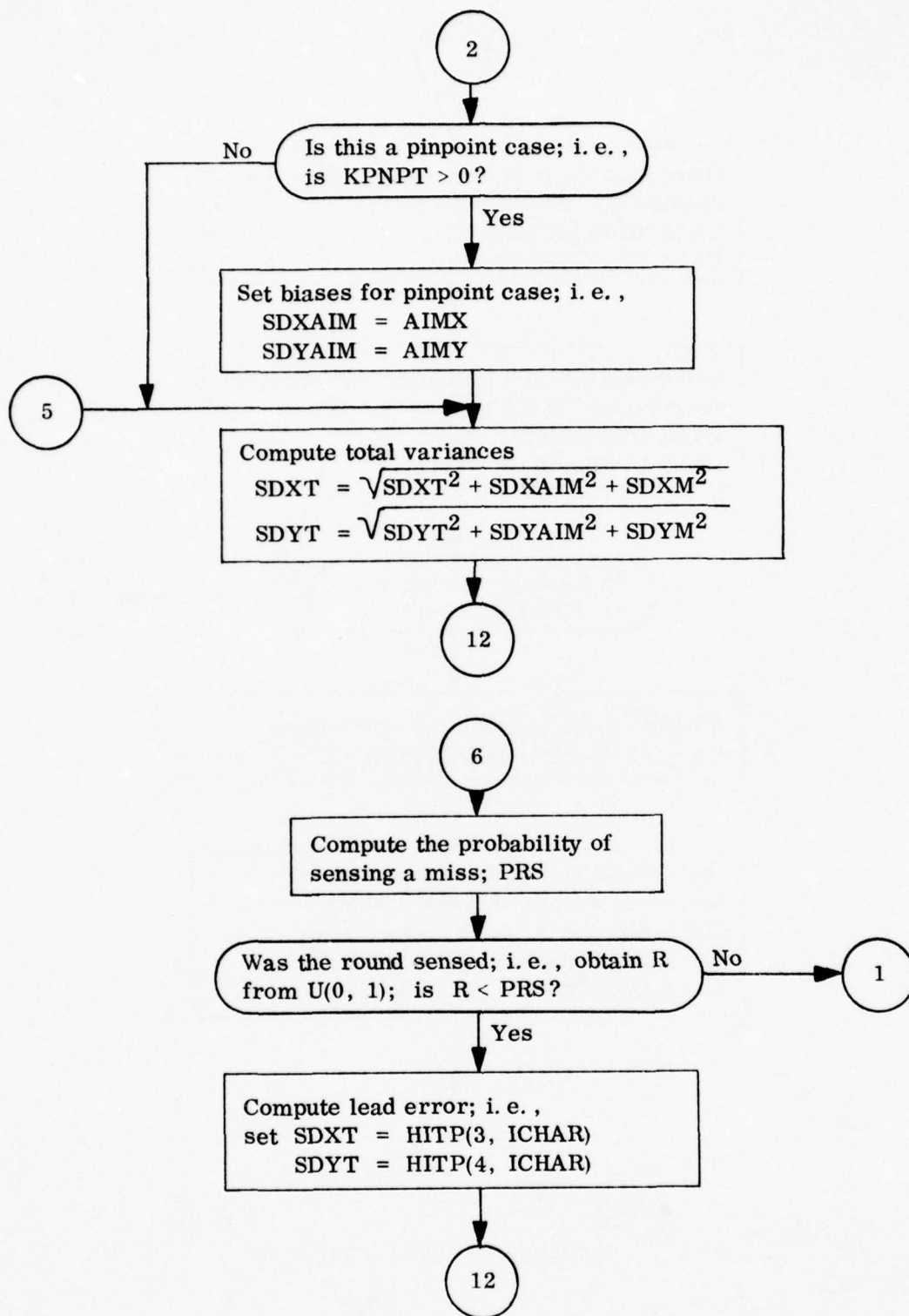
| | |
|-------|--------|
| DDSX2 | FNORM |
| DDSX3 | HIPROB |



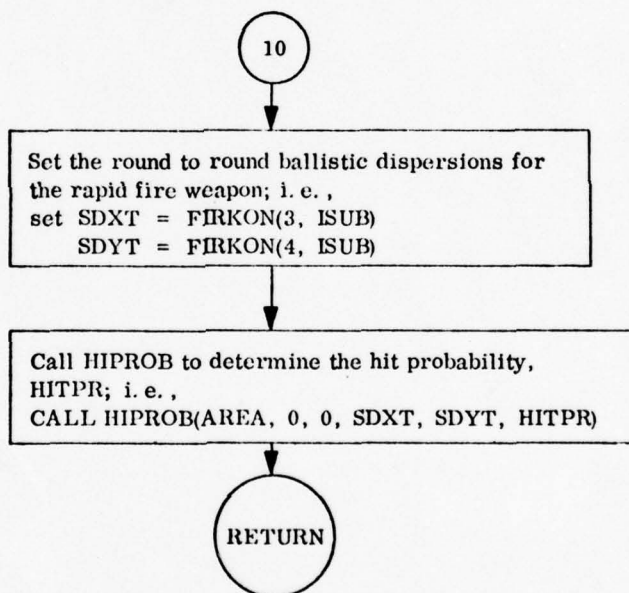
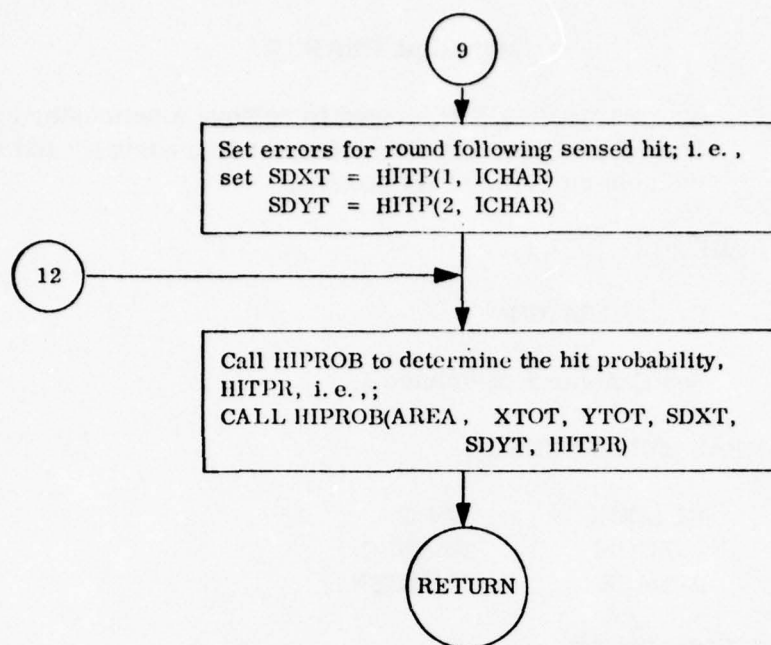
Subroutine HPROB: Firing Accuracy



Subroutine HPROB: Continued



Subroutine HPROB: Continued



Subroutine HPROB: Continued

Subroutine HRAPUP

PURPOSE: Subroutine HRAPUP is used to remove a helicopter element from the battle when the helicopter is a casualty and is also the sole survivor of its section.

CALLING SEQUENCE:

CALL HRAPUP

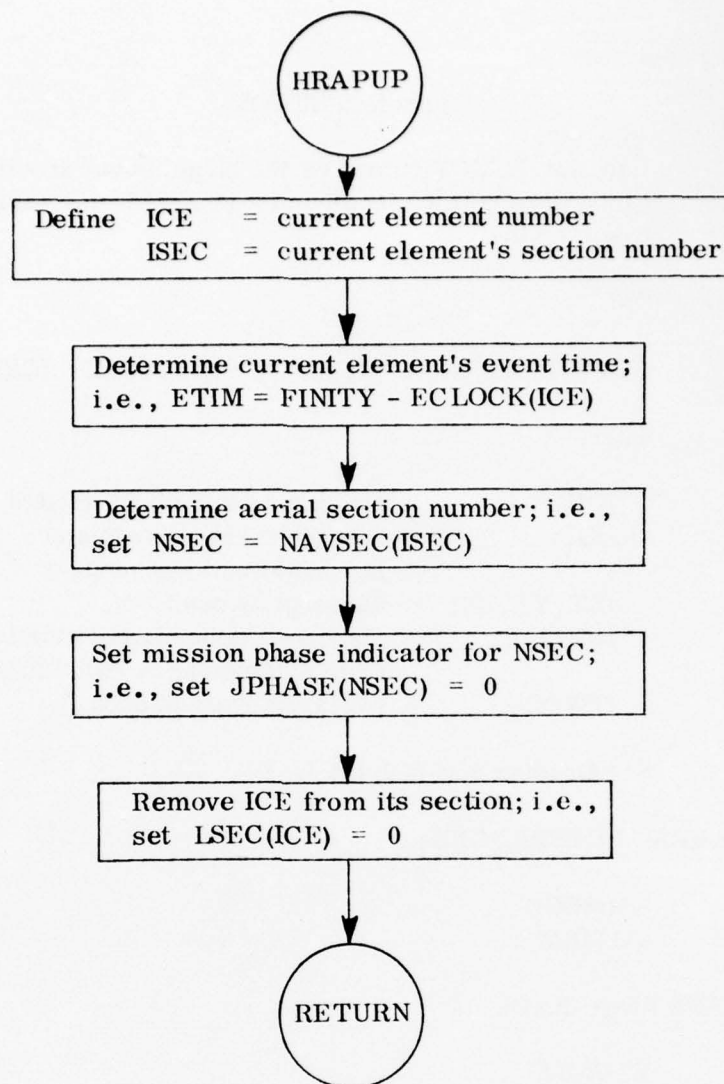
METHOD: See Chapter 9 of Volume 1.

COMMON AREAS REFERENCED:

| | |
|--------|--------|
| ECLOCK | LSEC |
| ICECOM | NAVSEC |
| JPHASE | NUMBER |

SUBROUTINES REQUIRED:

None



Subroutine HRAPUP: Removing Casualty Helicopter

Function HTCOV

PURPOSE: Function HTCOV computes the target cover fraction according to the parabolic trajectory of a projectile for aerial vehicle fire missions.

CALLING SEQUENCE:

COV = HTCOV(ICE, XI, YI, ZI, IT, XT, YT, ZT, ICHAR, ITWCOD)

where

| | |
|--------------|--|
| ICE | = the observer element number |
| (XI, YI, ZI) | = the observer's coordinates |
| IT | = the target element number |
| (XT, YT, ZT) | = the target's position |
| ICHAR | = the firer ammo characteristic from common area /IHTPRB/ |
| ITWCOD | = the target weapon code. |

METHOD: See Chapter 8 of Volume 1.

COMMON AREAS REFERENCED:

AMMOCH
TGTDIM

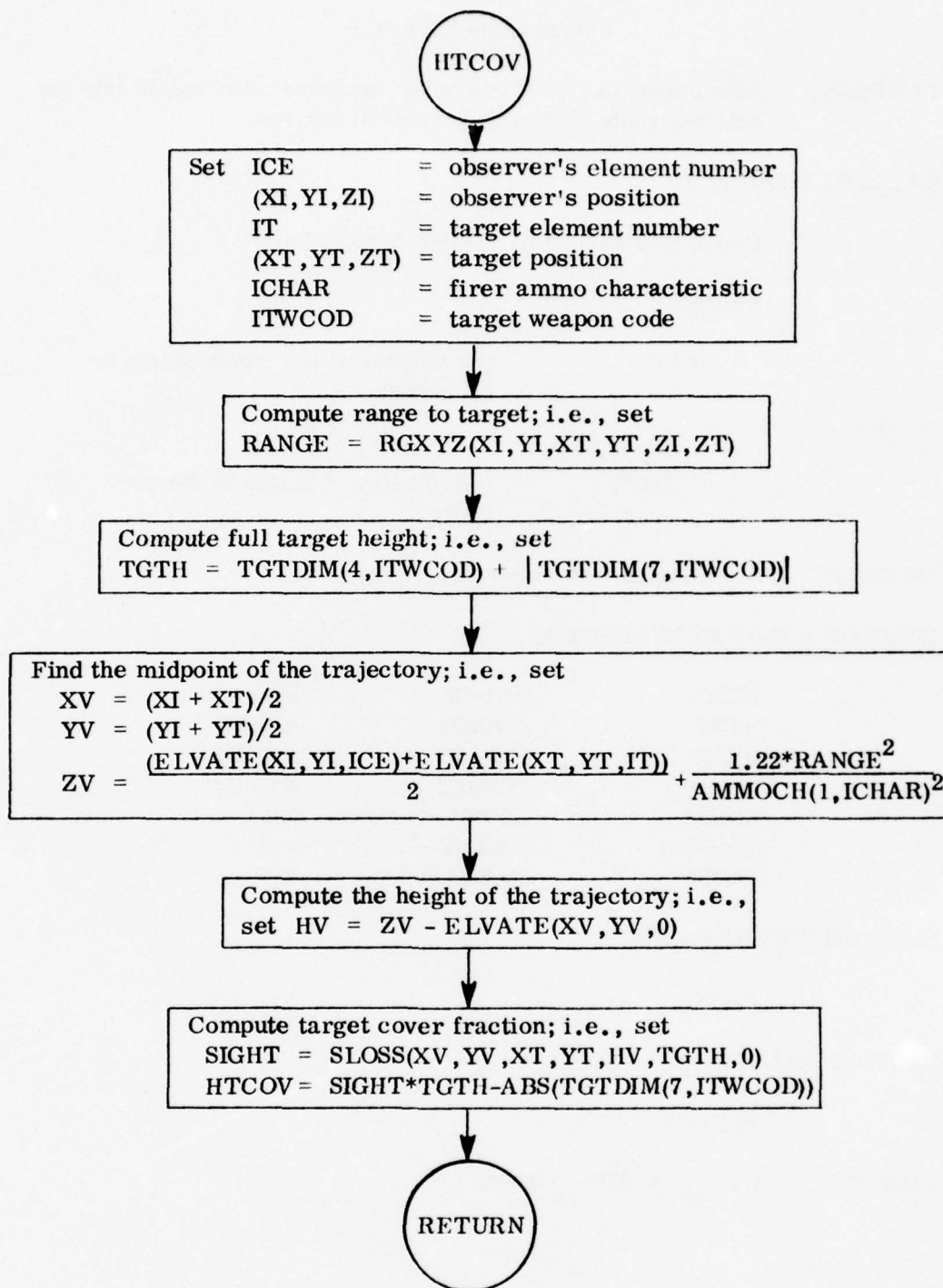
SUBROUTINES REQUIRED:

ELVATE
RGXYZ
SLOSS

HTCOV CALLED BY:

HFIRE

LENGTH: $3BA_{16} = 954_{10}$ bytes



Subroutine HTCOV: Target Cover Fraction for Helicopters

Subroutine HXYMCP

PURPOSE: Subroutine HXYMCP is used to load new route points into the existing route arrays for an aerial section.

CALLING SEQUENCE:

CALL HXYMCP(IKAP,XOPT,YOPT,ZOPT)

where

IKAP = the number of new route points to be loaded

XOPT,YOPT,
ZOPT = coordinates of points in the new route

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| HXRT | IPHASE | MANHEL |
| HYRT | IUNACT | NAVSEC |
| HZRT | JPHASE | NUMBER |
| ICAP1 | JUNACT | RTSIZE |
| ICAP2 | LCPE | XRT |
| ICECOM | LMANU | YRT |
| ISORG | MANLDR | ZRT |

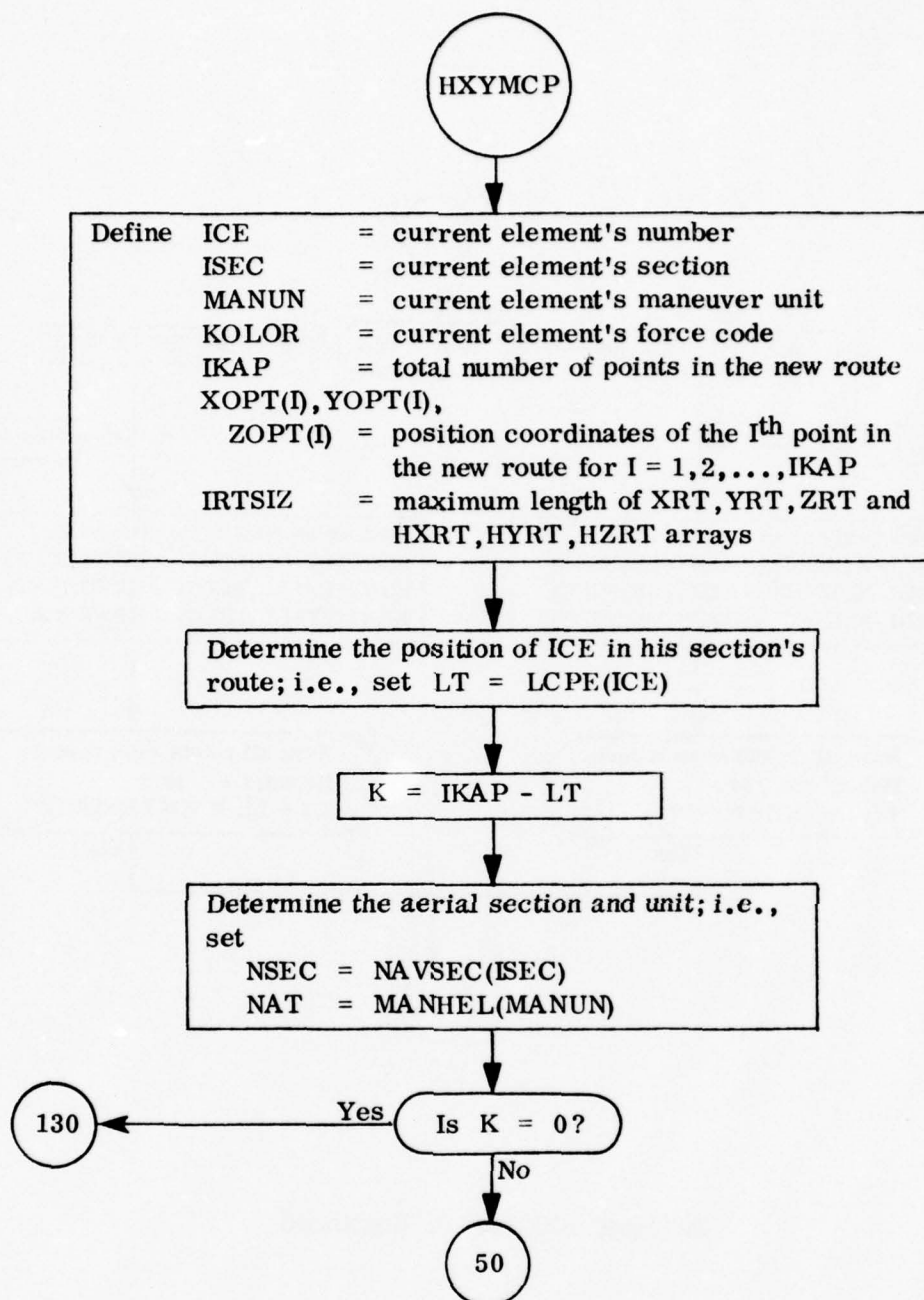
SUBROUTINES REQUIRED:

None

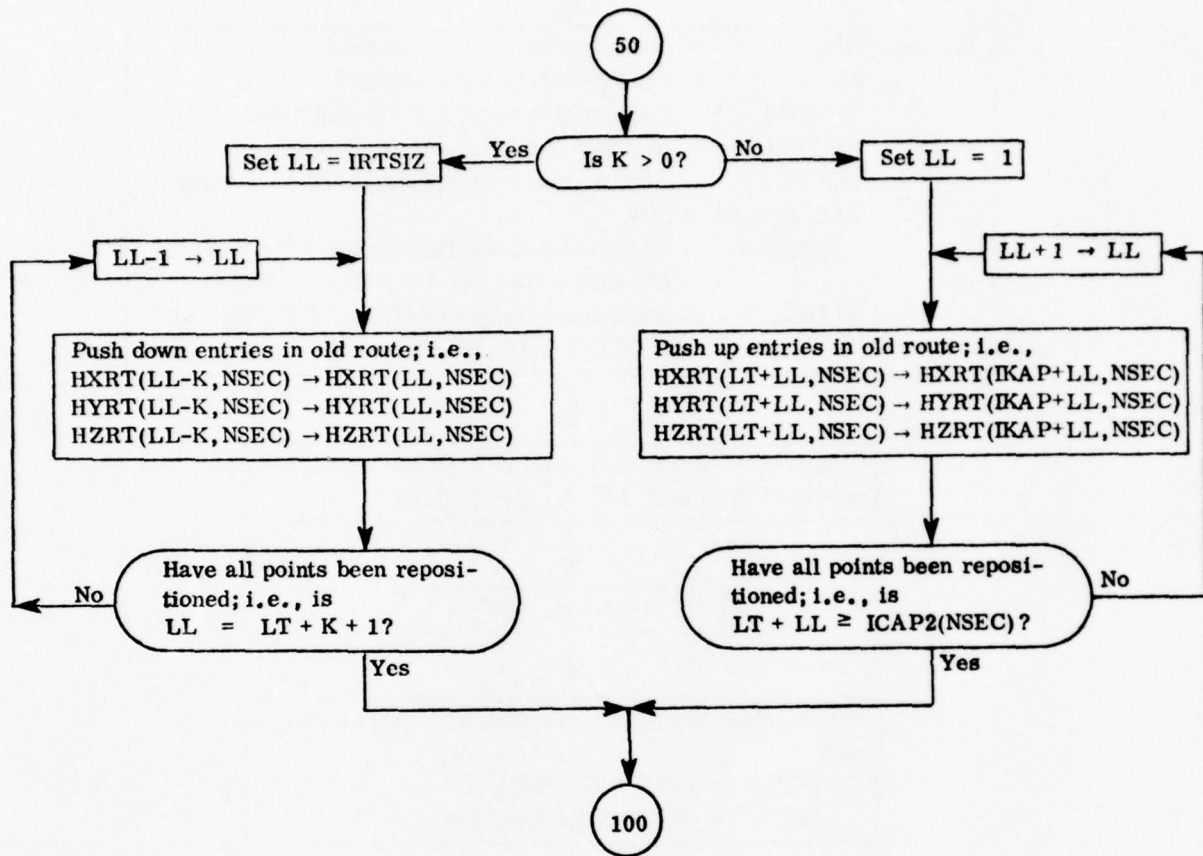
HXYMCP CALLED BY:

PICKRT

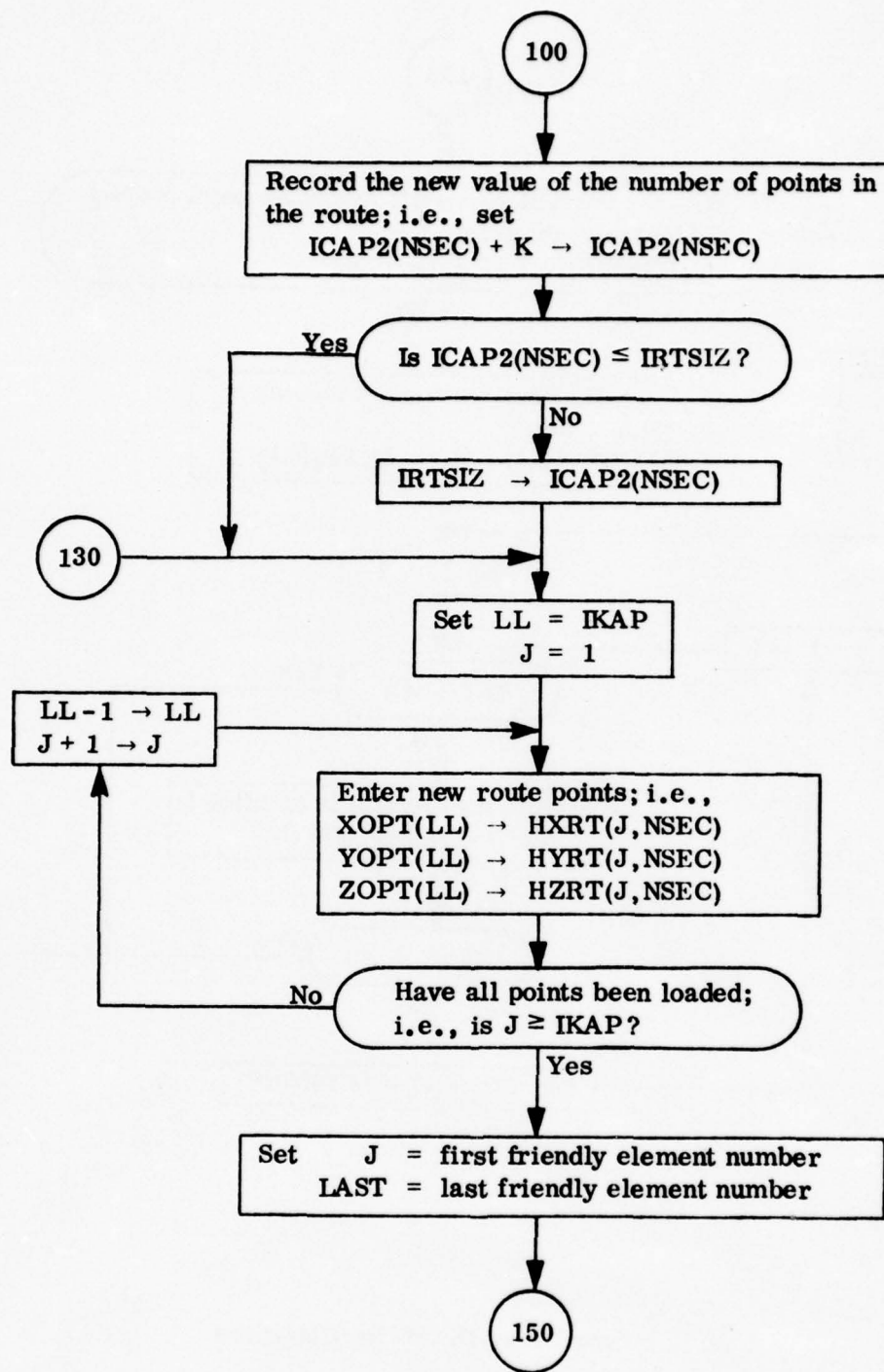
LENGTH: CEO₁₆ = 3296₁₀ bytes



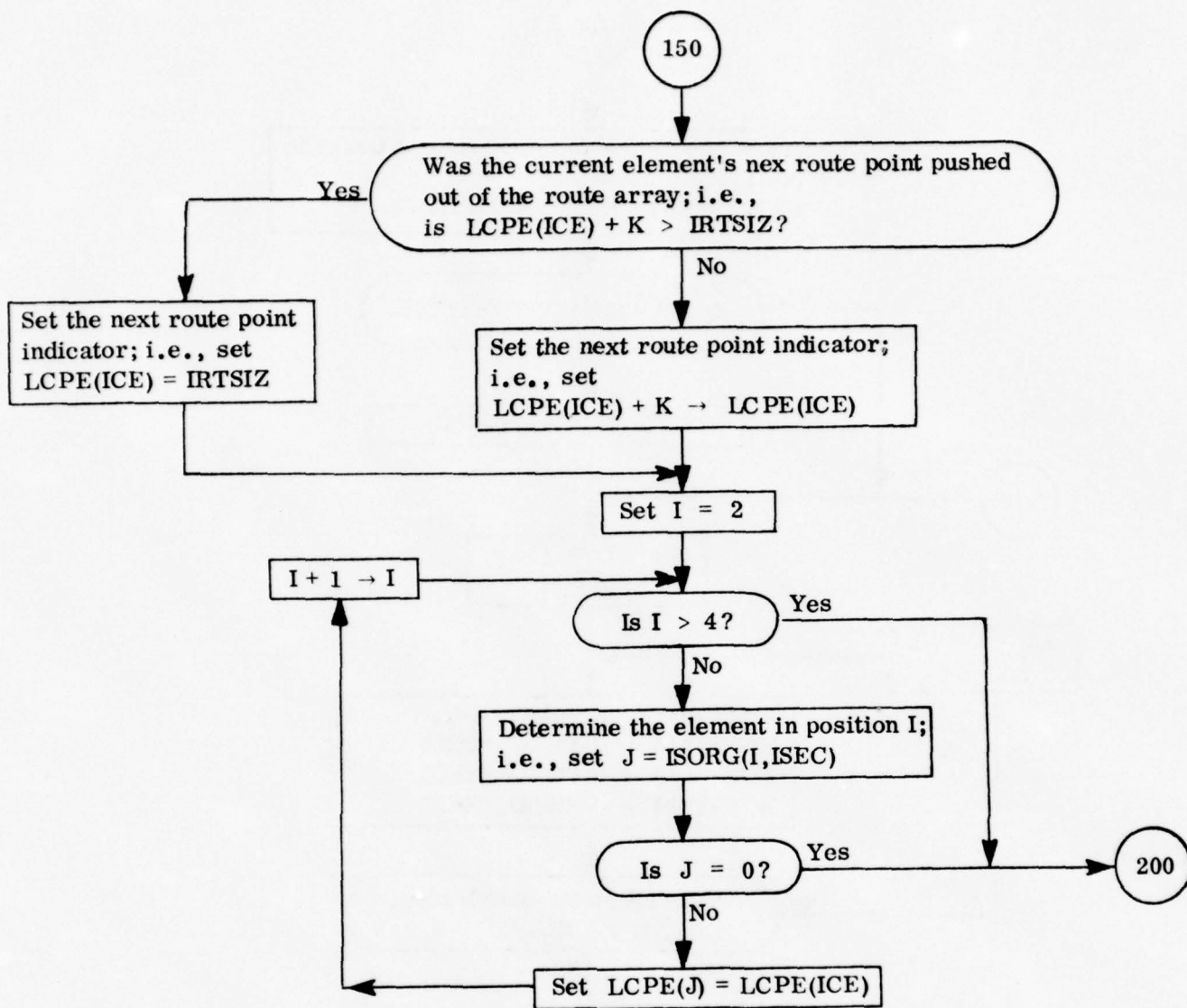
Subroutine HXYMCP: Recording the Desired Route for an Aerial Section



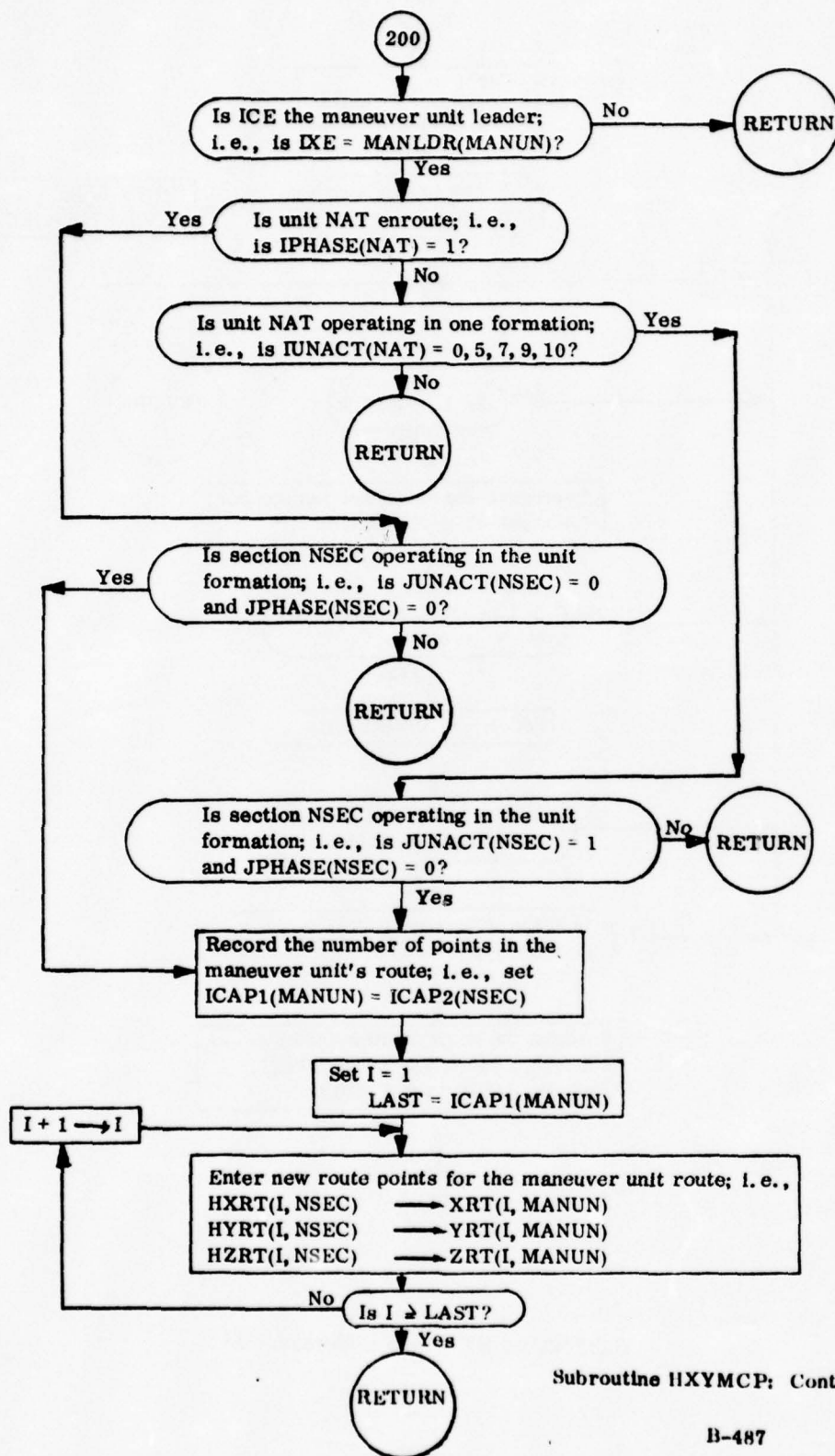
Subroutine HXYMCP: Continued



Subroutine HXYMCP: Continued

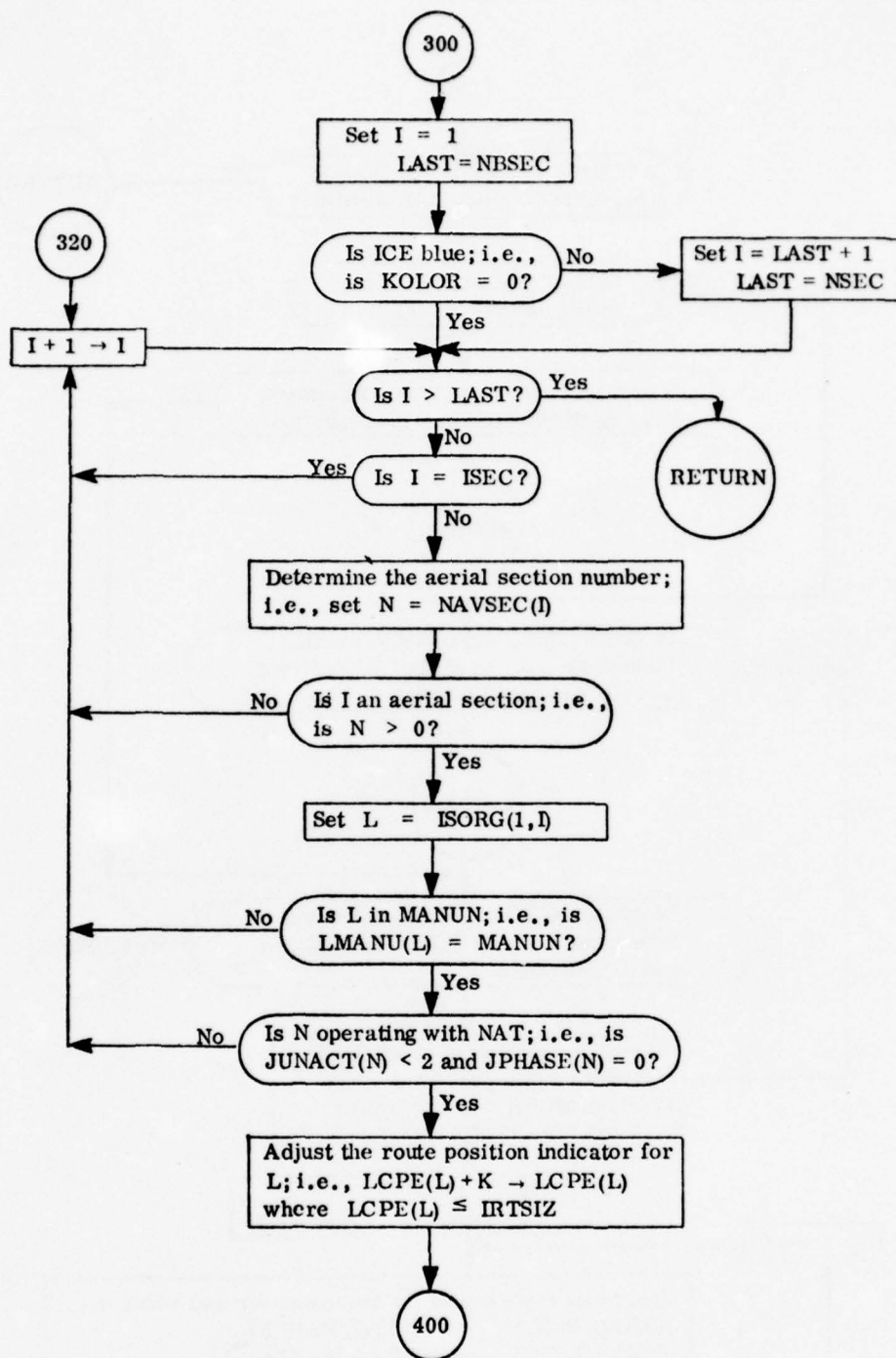


Subroutine HXYMCP: Continued

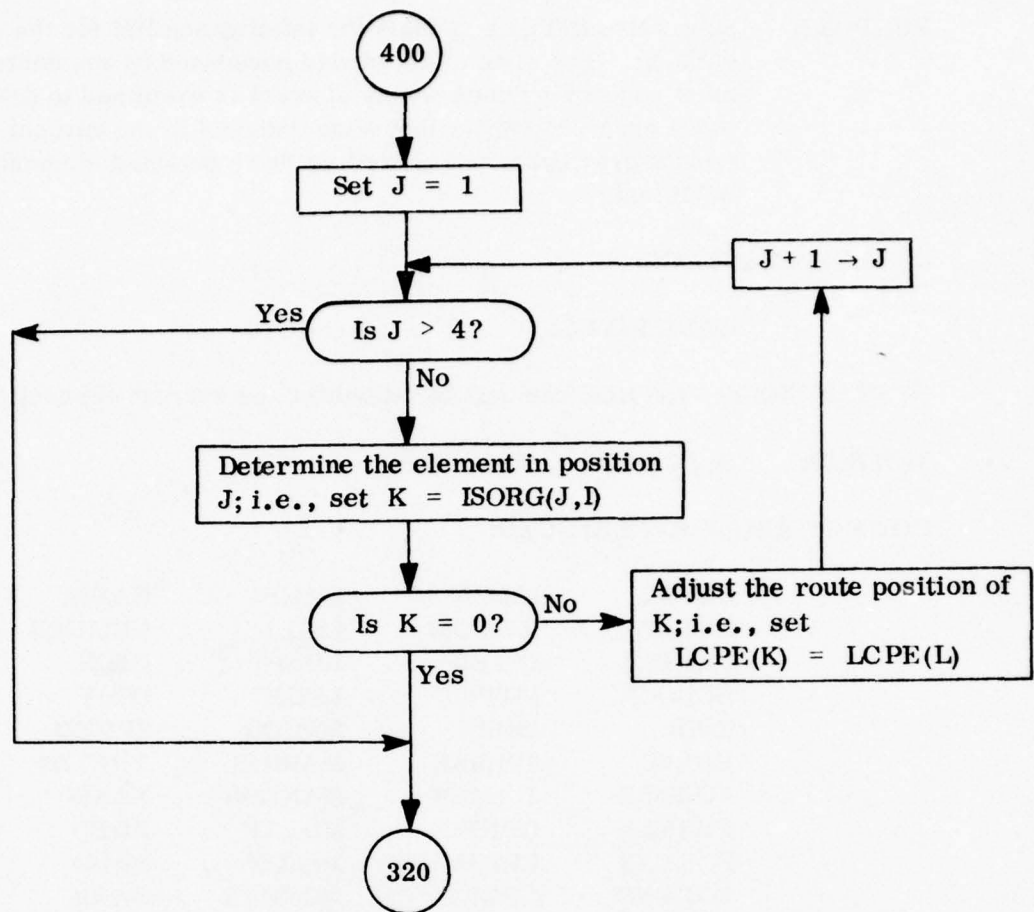


Subroutine HXYMCP: Continued

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Subroutine HXYMCP: Continued



Subroutine HXYMCP: Continued

Subroutine INTELL¹

PURPOSE: Subroutine INTELL updates the intelligence list for the current element. The state of knowledge possessed by the current element concerning each enemy element is examined to determine those enemy elements that were detected in the current element's previous event as well as those detected elements which were lost.

CALLING SEQUENCE:

CALL INTELL

RESTRICTIONS: INTELL can only be called for the current element.

METHOD: See Chapter 4, Reference 2.

COMMON AREAS REFERENCED:

| | | | |
|--------|--------|--------|--------|
| ADPOD | IADPM | LIMOV | NAXIS |
| ANGLIM | ICECOM | LKILL | NUMBER |
| DETTSQ | INTEL | LMSPT | OBJX |
| ECLOCK | ISFPC | LNUM | OBJY |
| EDIR | ISORG | LWCOD | SPDMU |
| EFELC | JPHASE | MANHEL | THETA0 |
| FORMSE | JUNACT | MANLDR | XAXIS |
| FORMSX | LDET | MDFAF | XDFO |
| FORMXS | LDFSM | MISION | XPOD |
| FORMYS | LFELT | MOVPAR | YAXIS |
| IADCE | LHICE | NAVSEC | YDFO |
| | | | YPOD |

SUBROUTINES REQUIRED:

| | | | |
|-------|--------|--------|--------|
| DETT | IRANUD | LOS | ELOC |
| PK | DETSQ | NEUDET | ANGDIF |
| SENDI | FRANUD | COS | SPOT |
| RGXY | CONC | OFFSET | ATAN5 |
| | | | DETH |

¹The revised flow chart of subroutine INTELL appears in RF 3649 FR 74-1(U), Appendix D, pages B-22 R through B-47 b R.

Subroutine ISTHFF

PURPOSE: Subroutine ISTHFF is called to compute the ratio used in determining whether an intense fire fight exists or not.

CALLING SEQUENCE:

CALL ISTHFF(FFRAT)

where

FFRAT = ration of detected enemy survivors to
friendly survivors (output).

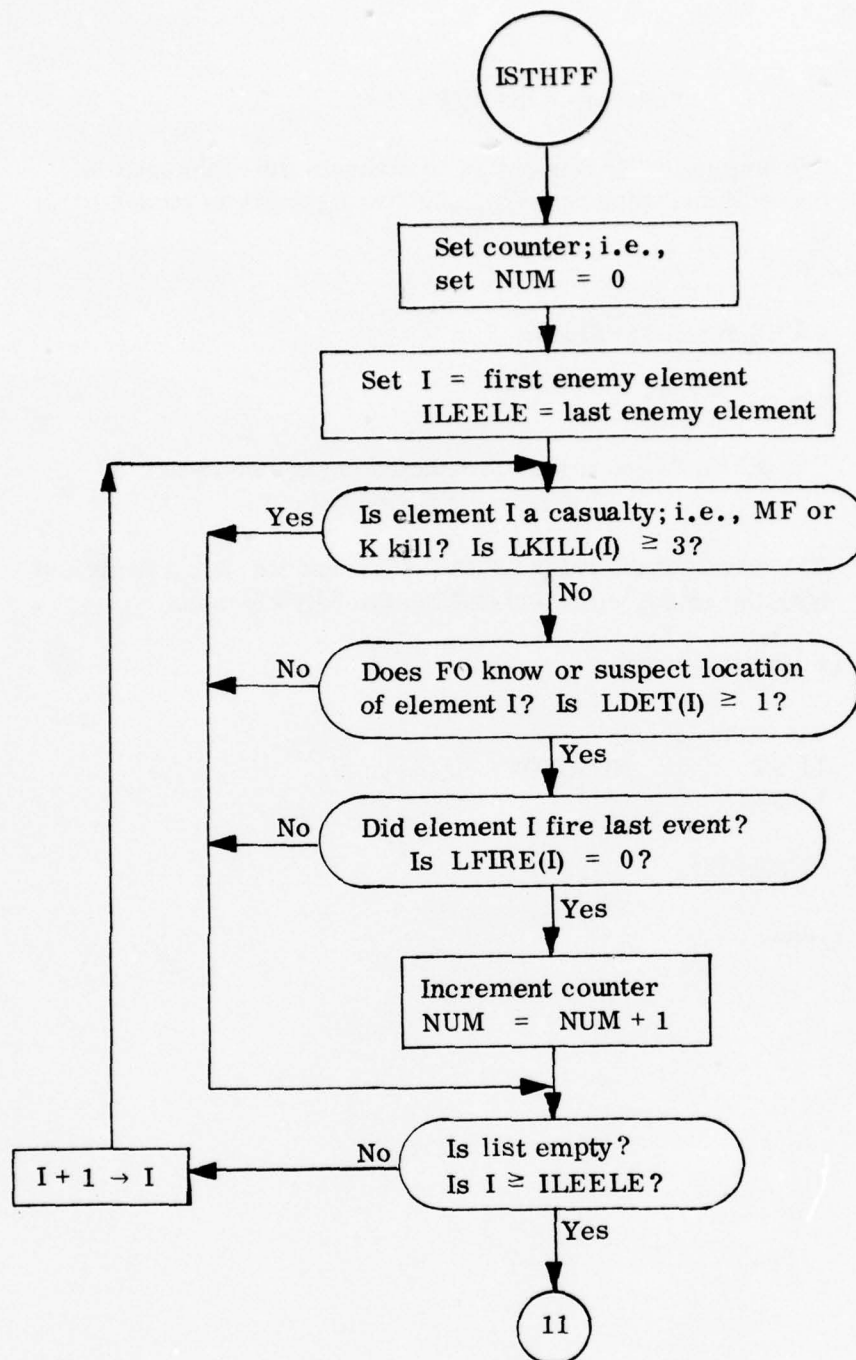
METHOD: The terms of the ratio FFRAT are found through a search of both the enemy elements and the friendly elements.

COMMON AREAS REFERENCED:

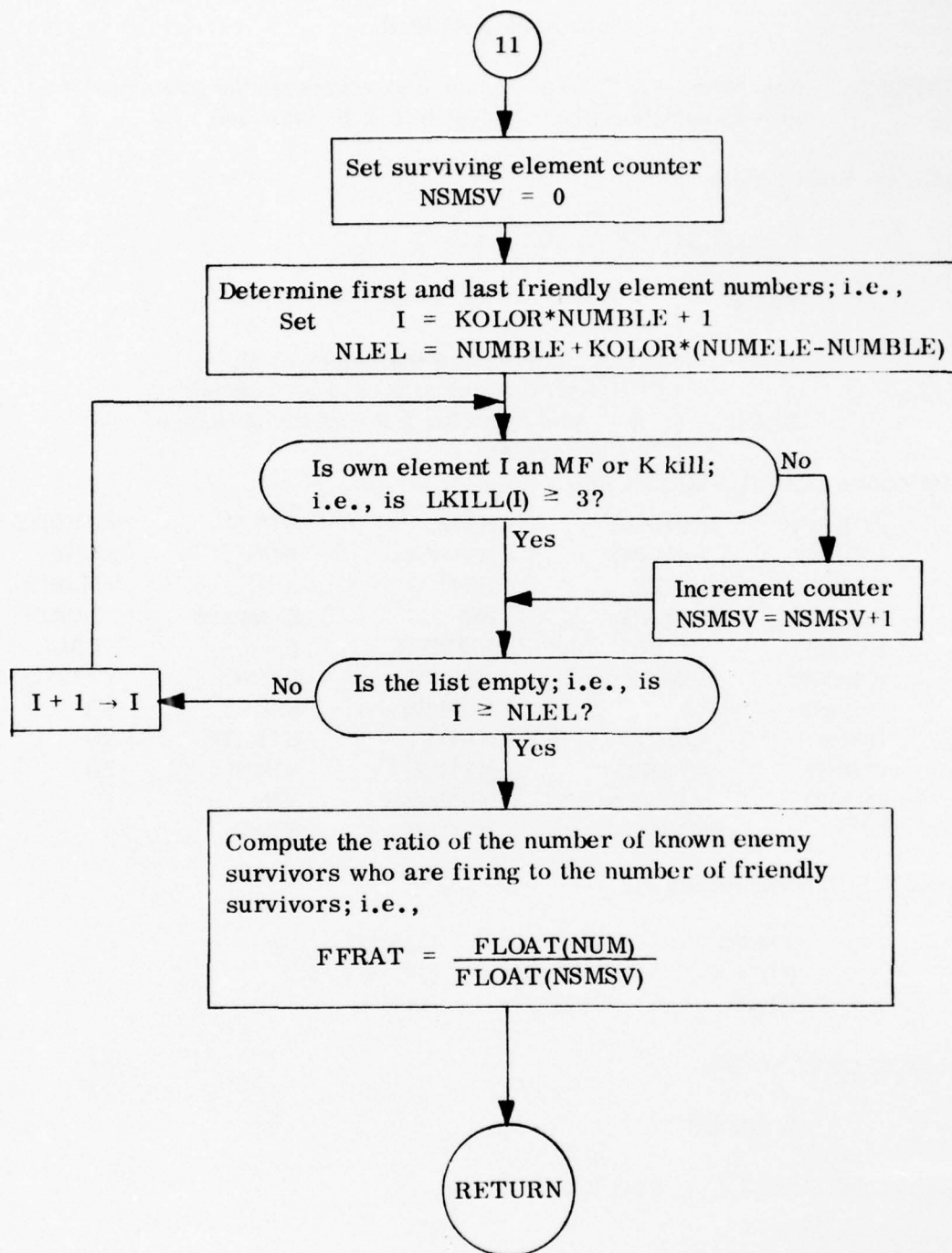
| | |
|--------|--------|
| ICECOM | LKILL |
| LDET | NUMBER |
| LFIRE | |

SUBROUTINES REQUIRED:

None



Subroutine ISTHFF: Computing the Fire Fight Ratio



Subroutine ISTHFF: Continued

Subroutine LAUNCH

PURPOSE: Subroutine LAUNCH is designed to represent the activities of a ground launcher when a missile is to be launched.

CALLING SEQUENCE:

CALL LAUNCH (TIME, LNCH)

where

TIME = computed duration of the launch event

LNCH = $\left\{ \begin{array}{l} 1 \text{ if a MISTIC missile is to be launched} \\ \text{this event for a direct fire mission} \\ 0 \text{ if otherwise} \end{array} \right.$

COMMON AREAS REFERENCED:

| | | | | |
|--------|--------|--------|--------|--------|
| ECLOCK | KPRIOR | NFB | OPEN | TDFRDY |
| EFELC | LAMMO | NFOFR | PNG | TDUD |
| ETIM | LFIRE | NFR | SDL | TIFRDY |
| EVBAR | LFLAG | NM | SETPAR | TLOAD |
| EVTIM | LFRND | NMISUN | SFR | TUSLD |
| ICECOM | LIMOV | NMLIM | SPINC | TYPMIS |
| IFBMIS | LNSET | NOMVH | SSR | WT |
| IFMC | LRNDC | NRL | STRTIM | XD |
| IFRND | LWCOD | NTELE | TBFR | YD |
| JFRND | MIDATA | NUMBER | TBL | |
| KFO | MREADY | NVOLM | TBSR | |

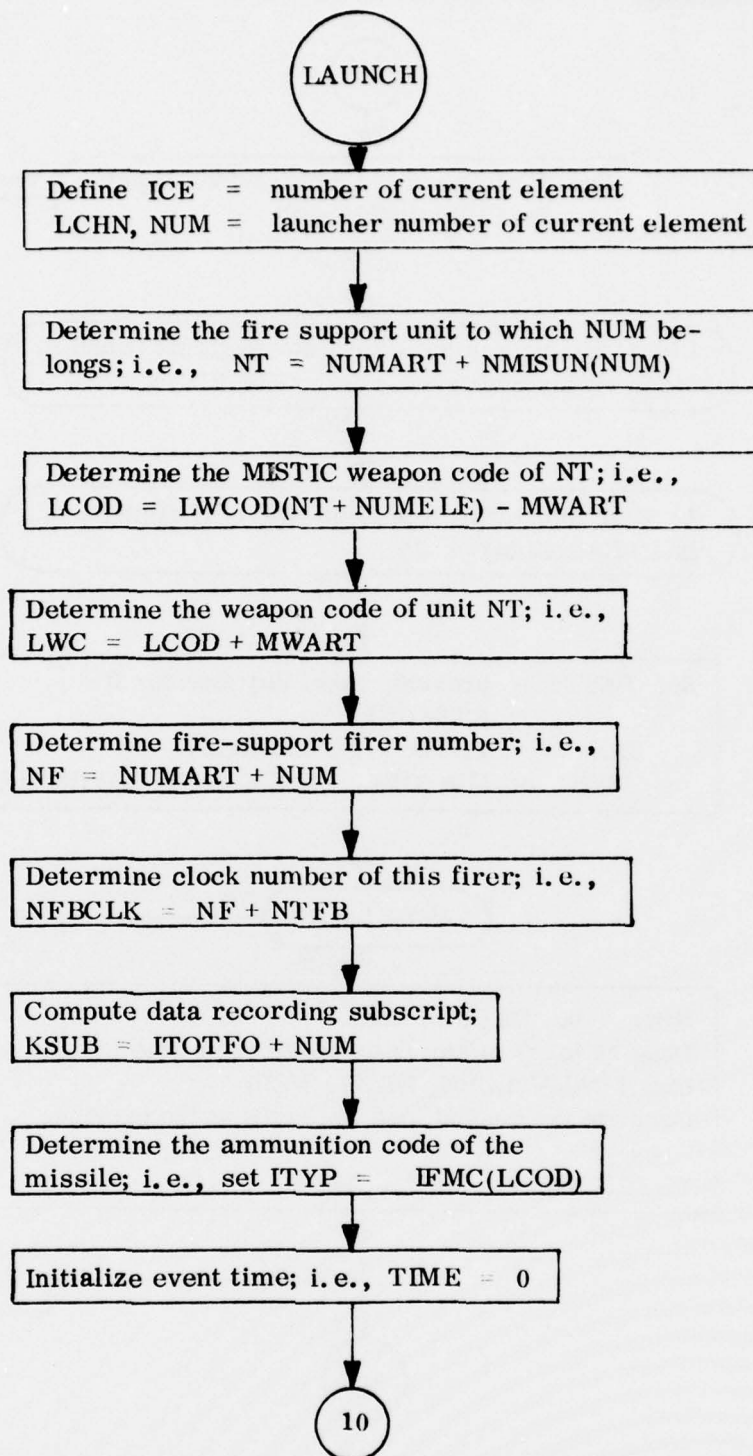
SUBROUTINES REQUIRED:

| | | |
|--------|--------|--------|
| AMMO | ELVATE | LOADM |
| CREATM | FRANUD | MICONP |
| ELOC | LNBFLT | RANND |

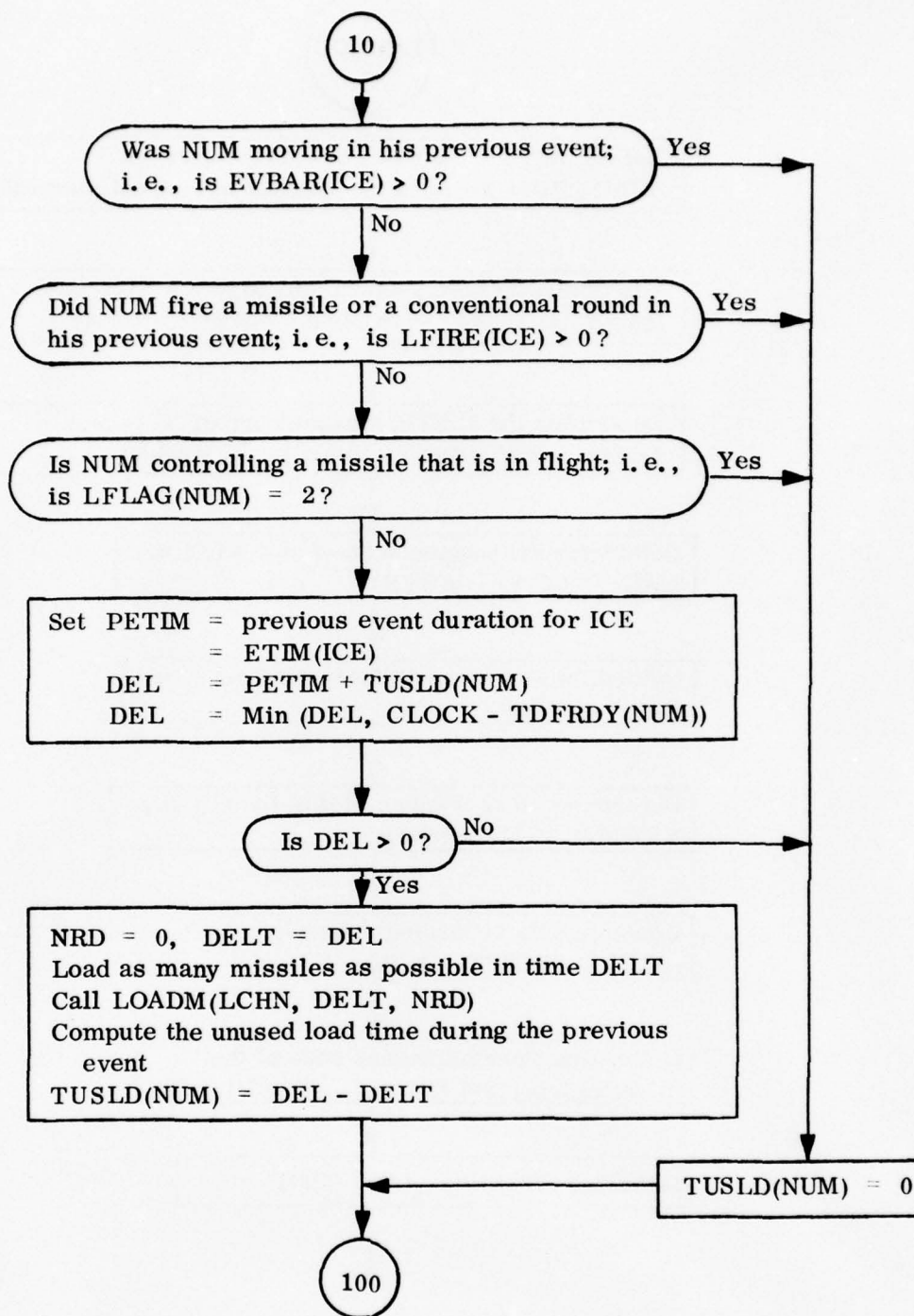
LAUNCH CALLED BY:

MAIN PROGRAM

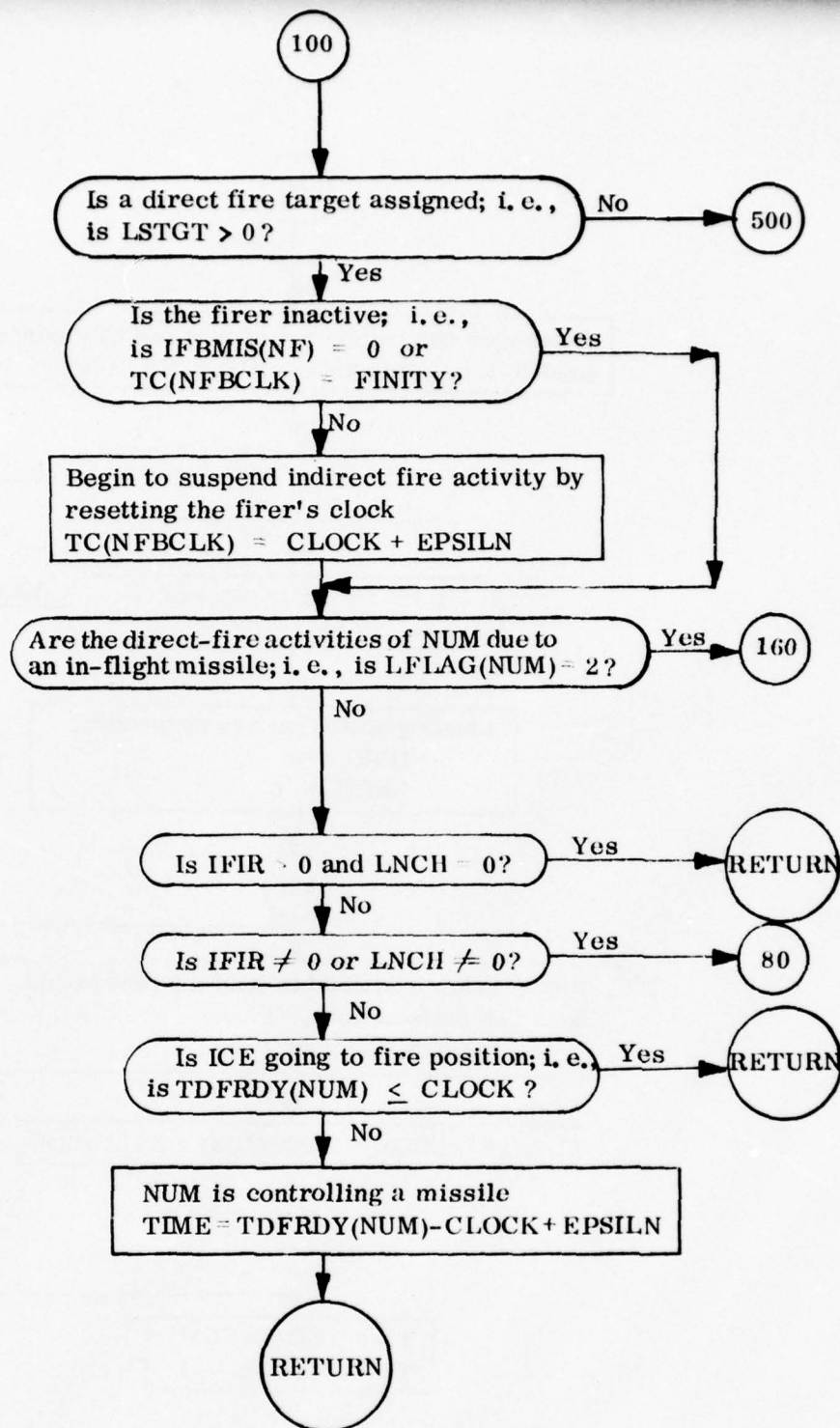
STORAGE: $24E4_{16} = 9444$ bytes



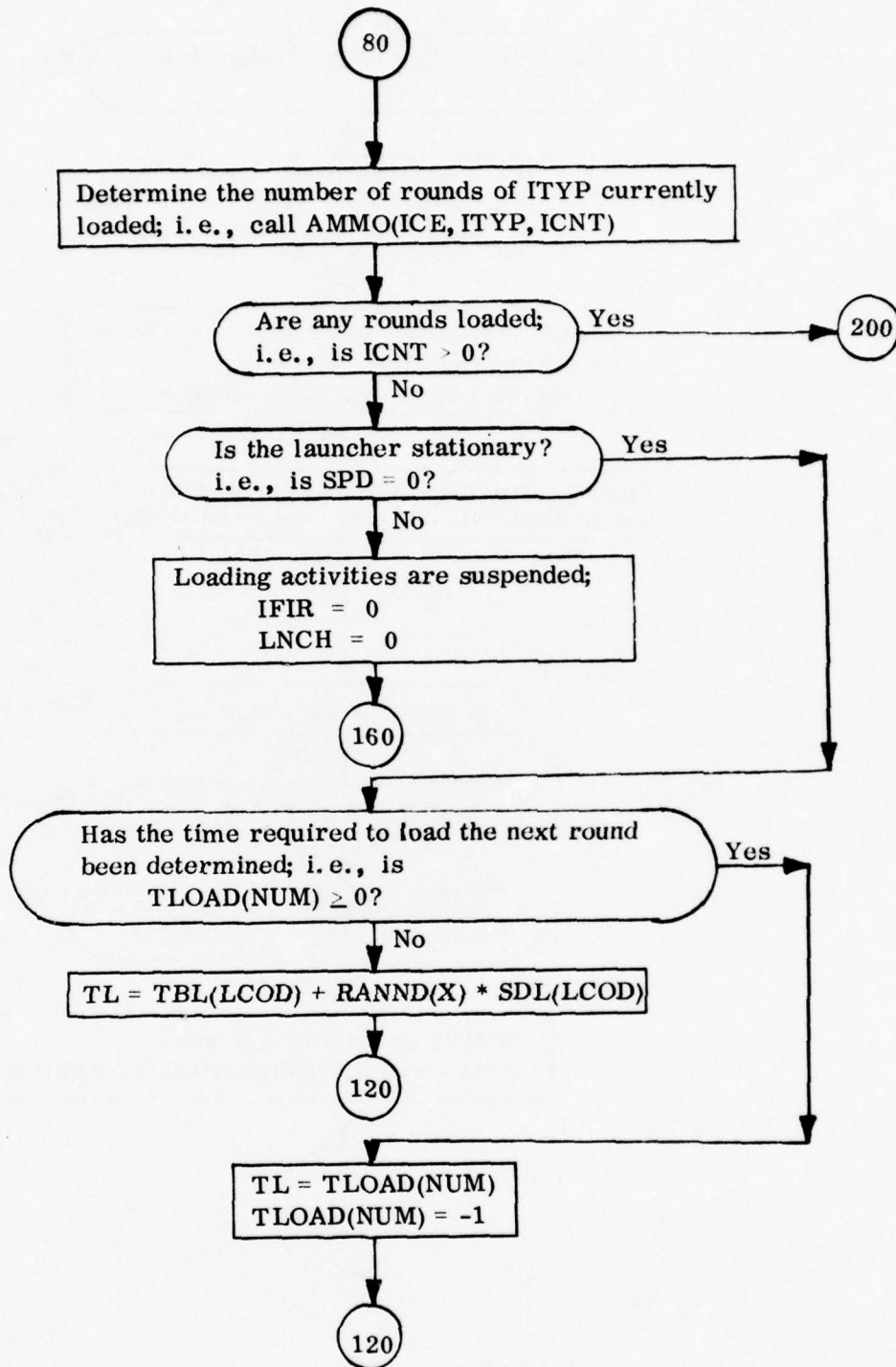
Subroutine LAUNCHII: Continued



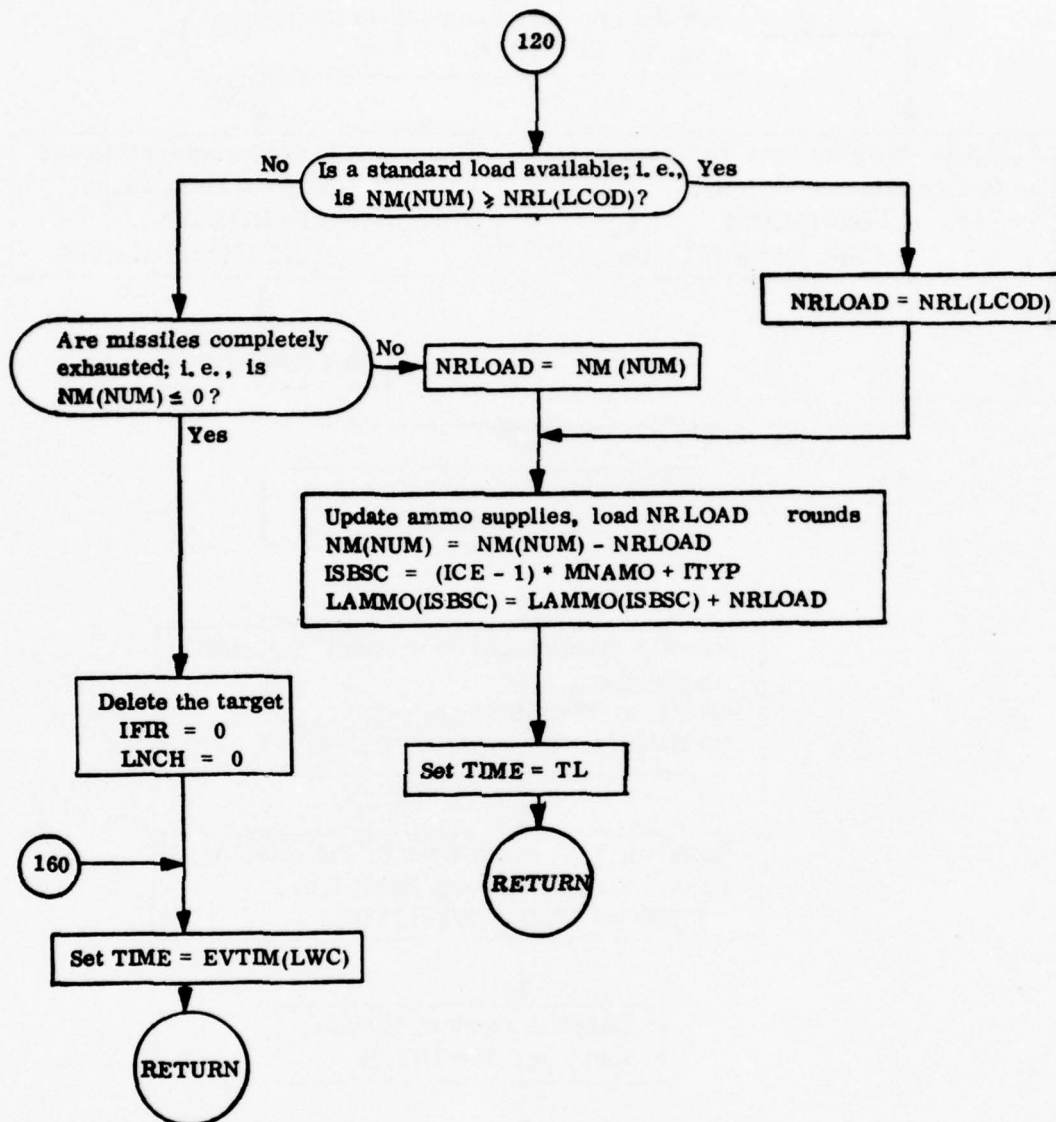
Subroutine LAUNCH: Continued



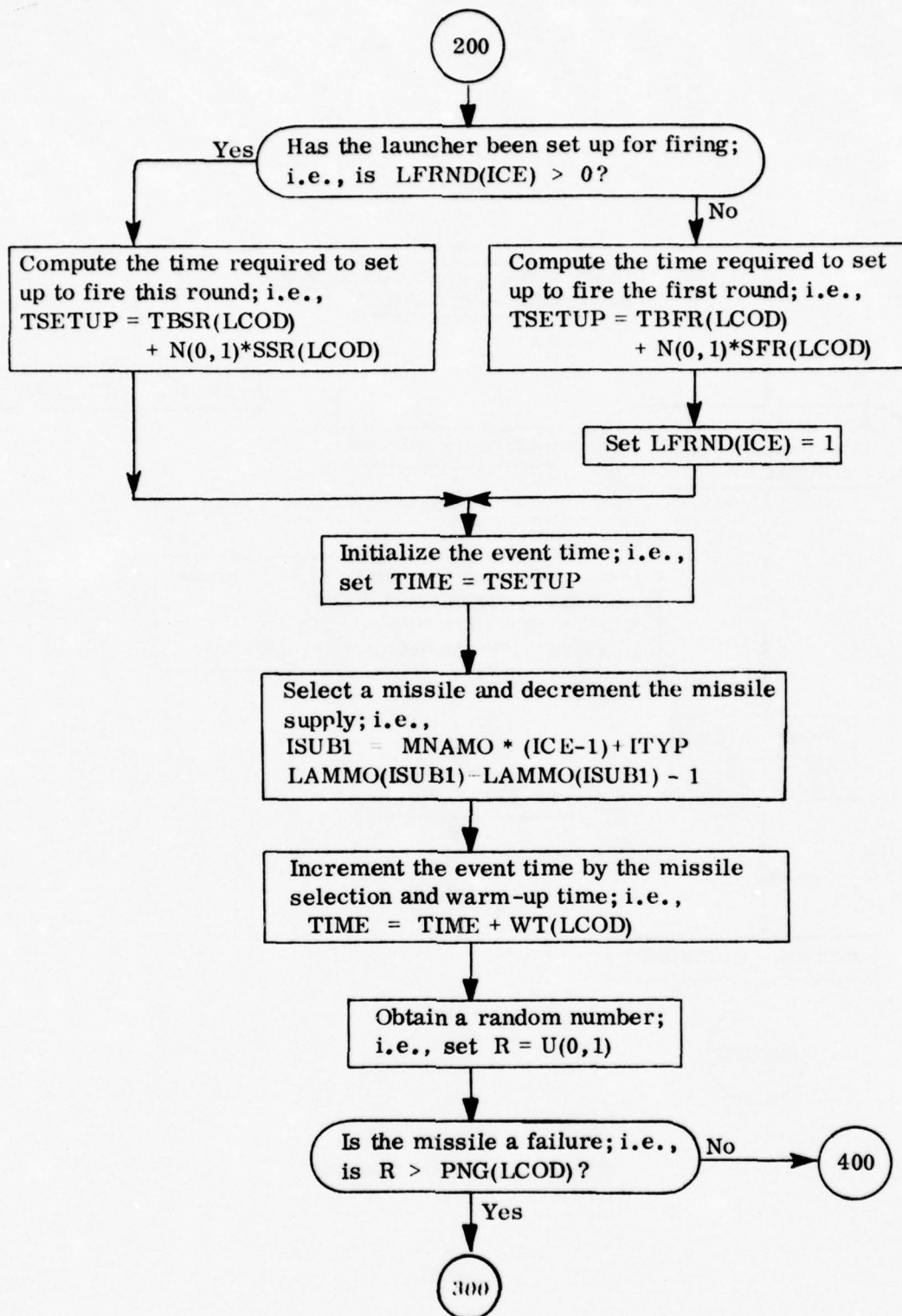
Subroutine LAUNCH: Continued



Subroutine LAUNCH: Continued

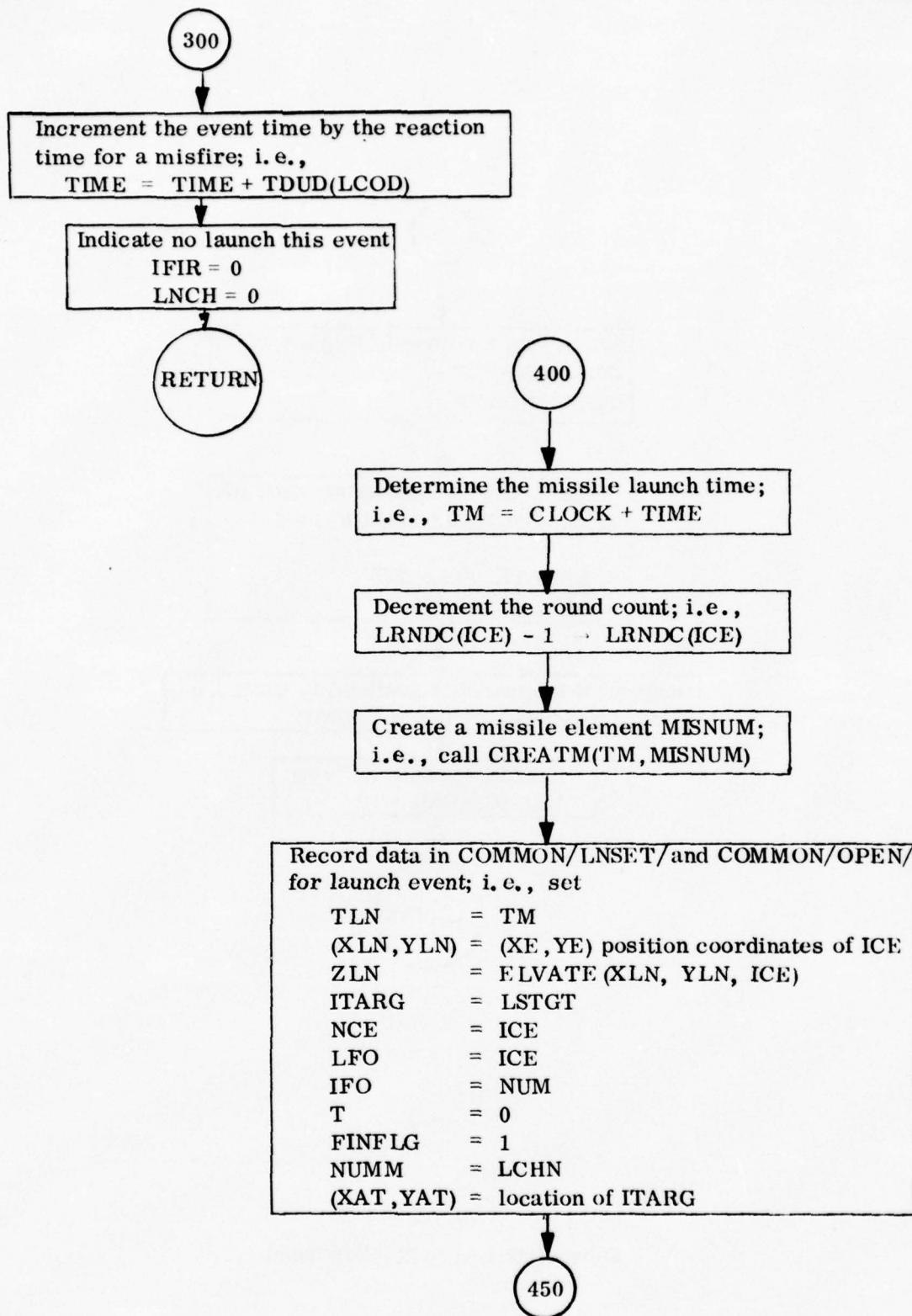


Subroutine LAUNCH: Continued

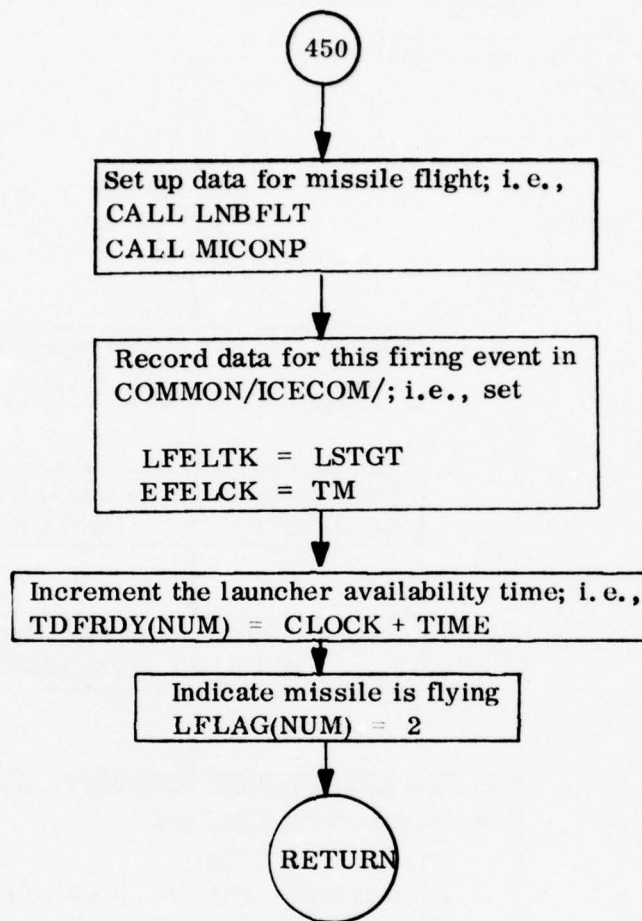


Subroutine LAUNCH: Continued

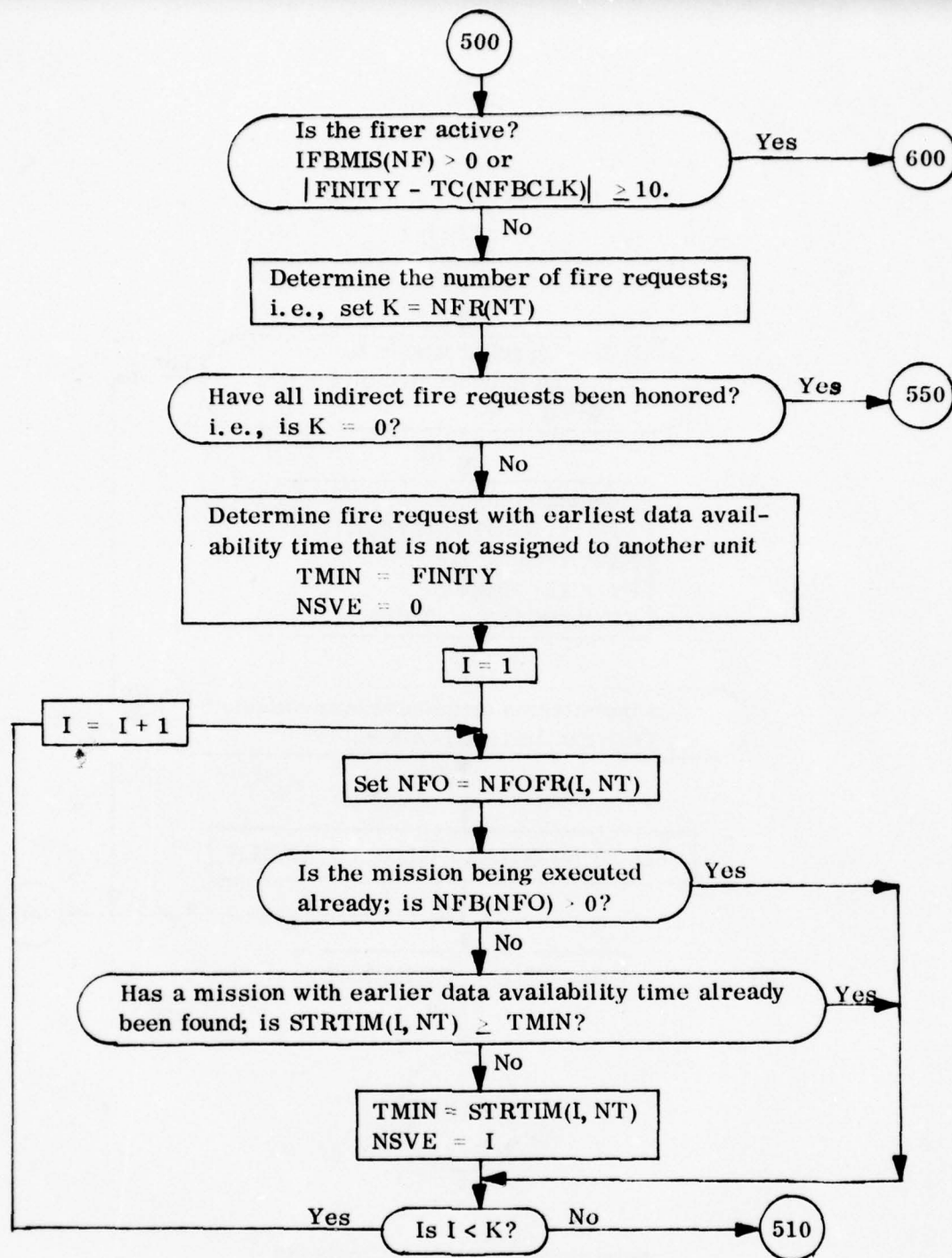
B-500



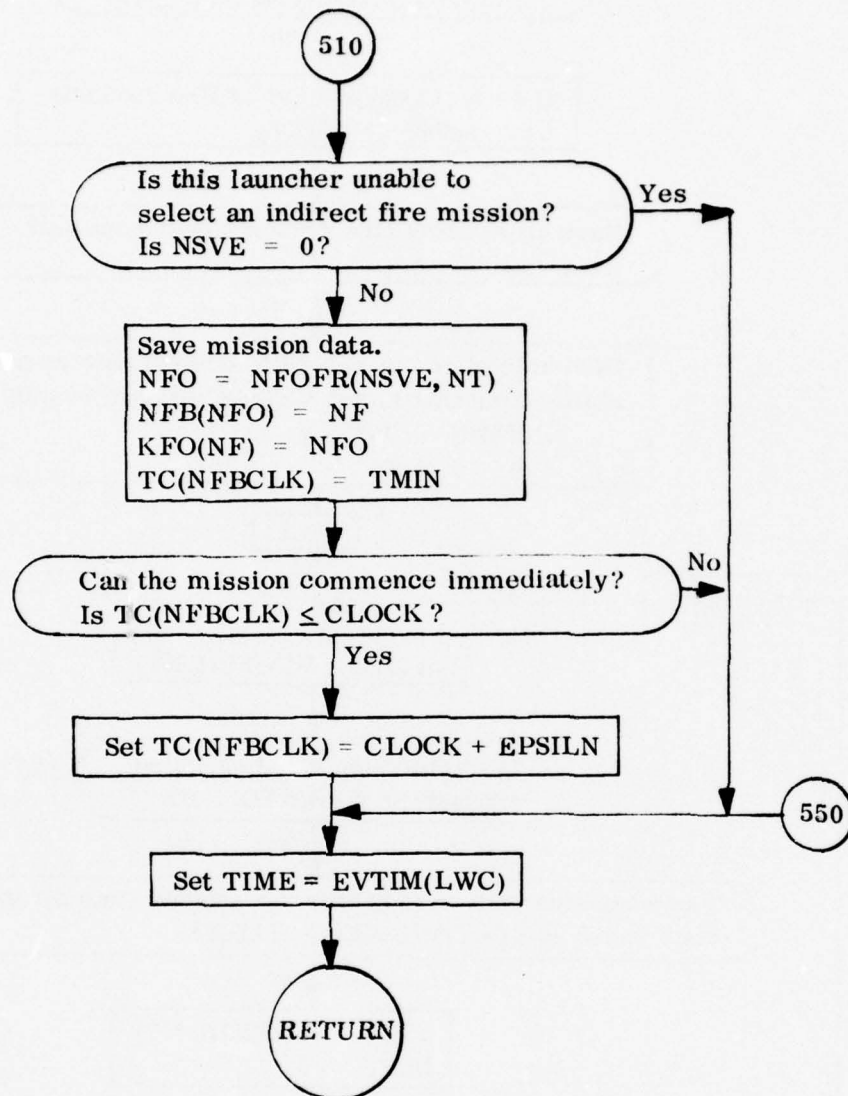
Subroutine LAUNCH: Continued



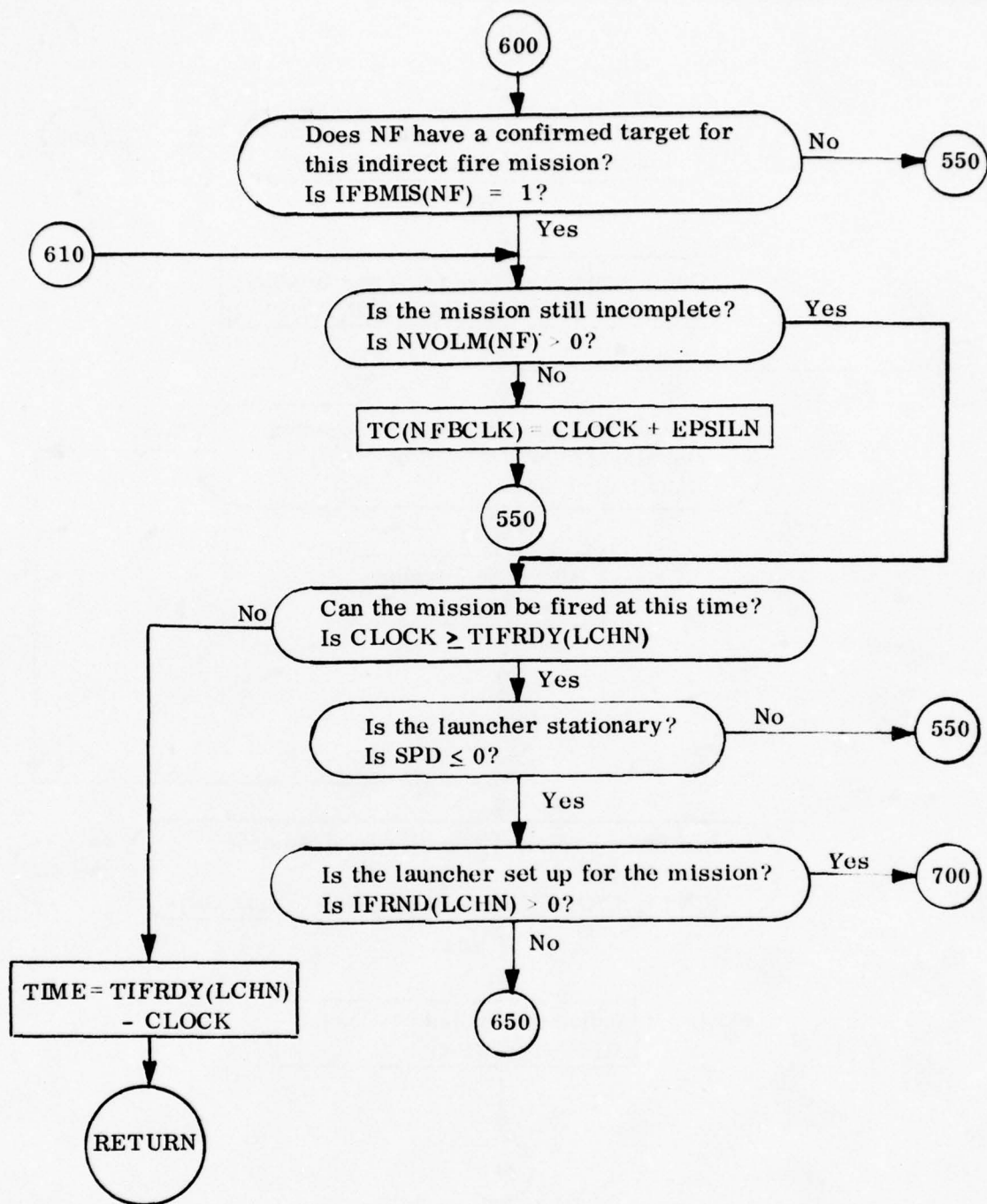
Subroutine LAUNCH: Continued



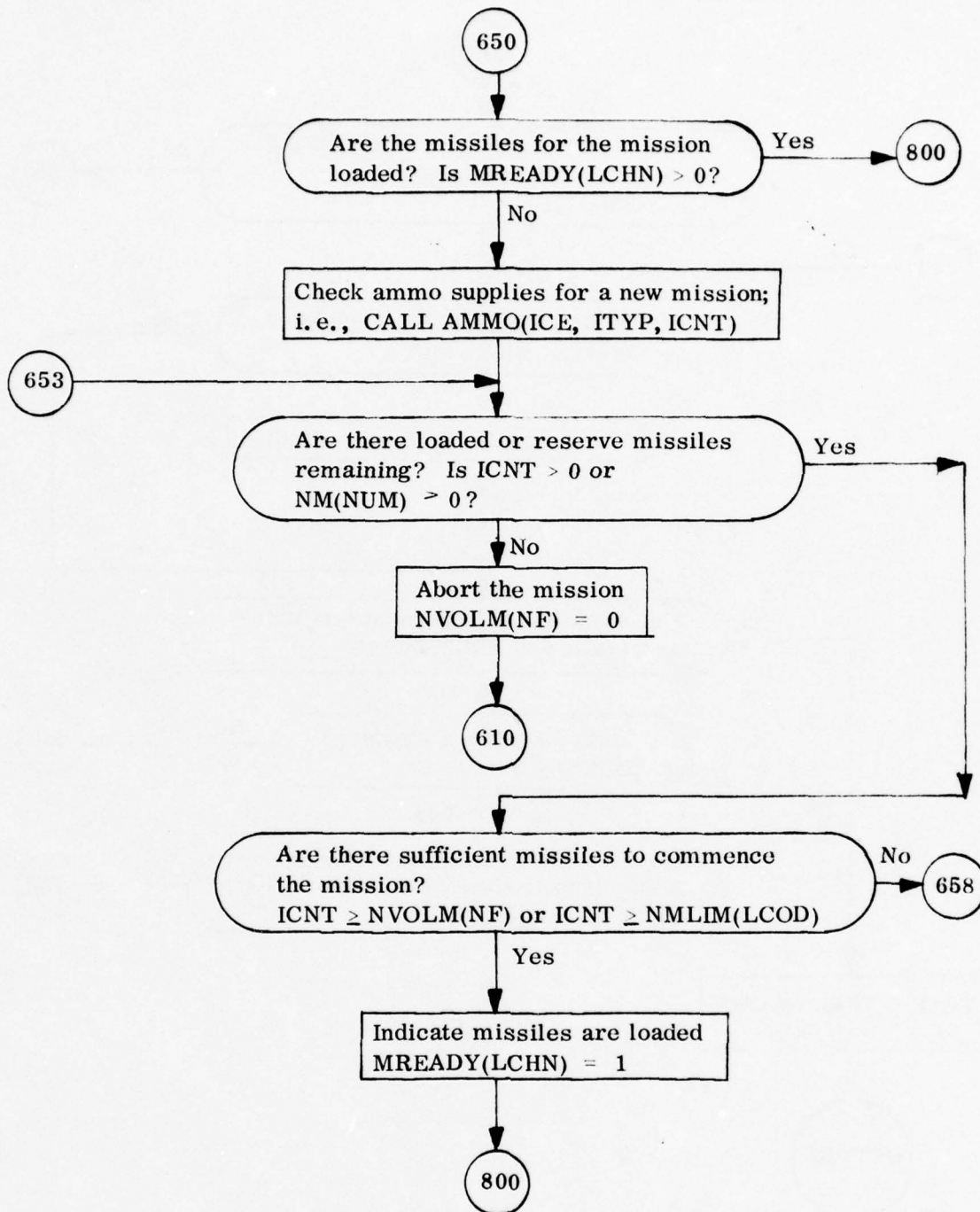
Subroutine LAUNCH: Continued



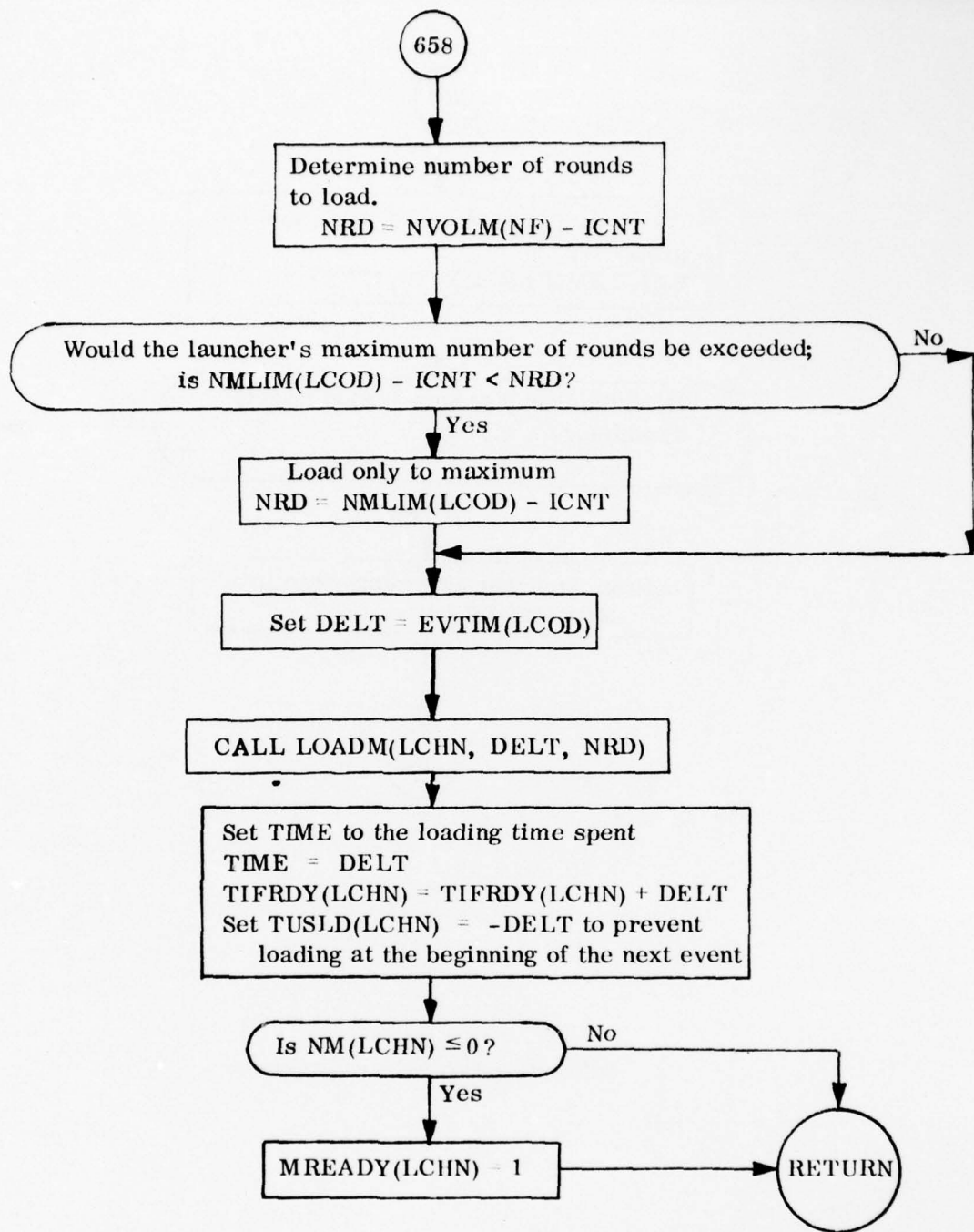
Subroutine LAUNCH: Continued



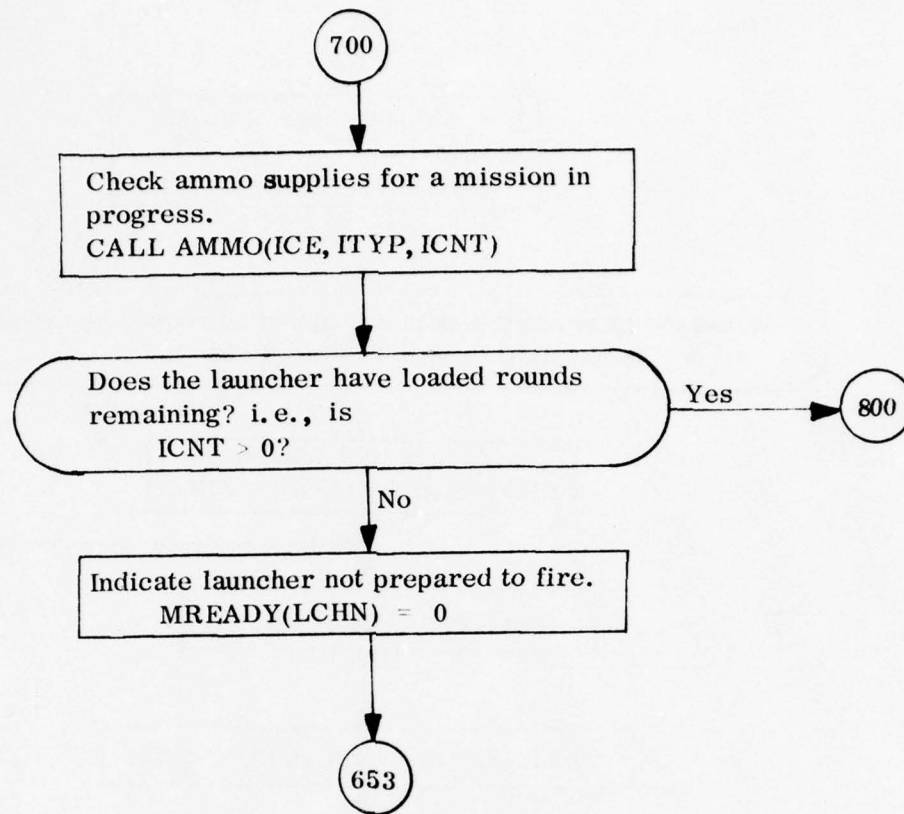
Subroutine LAUNCH: Continued



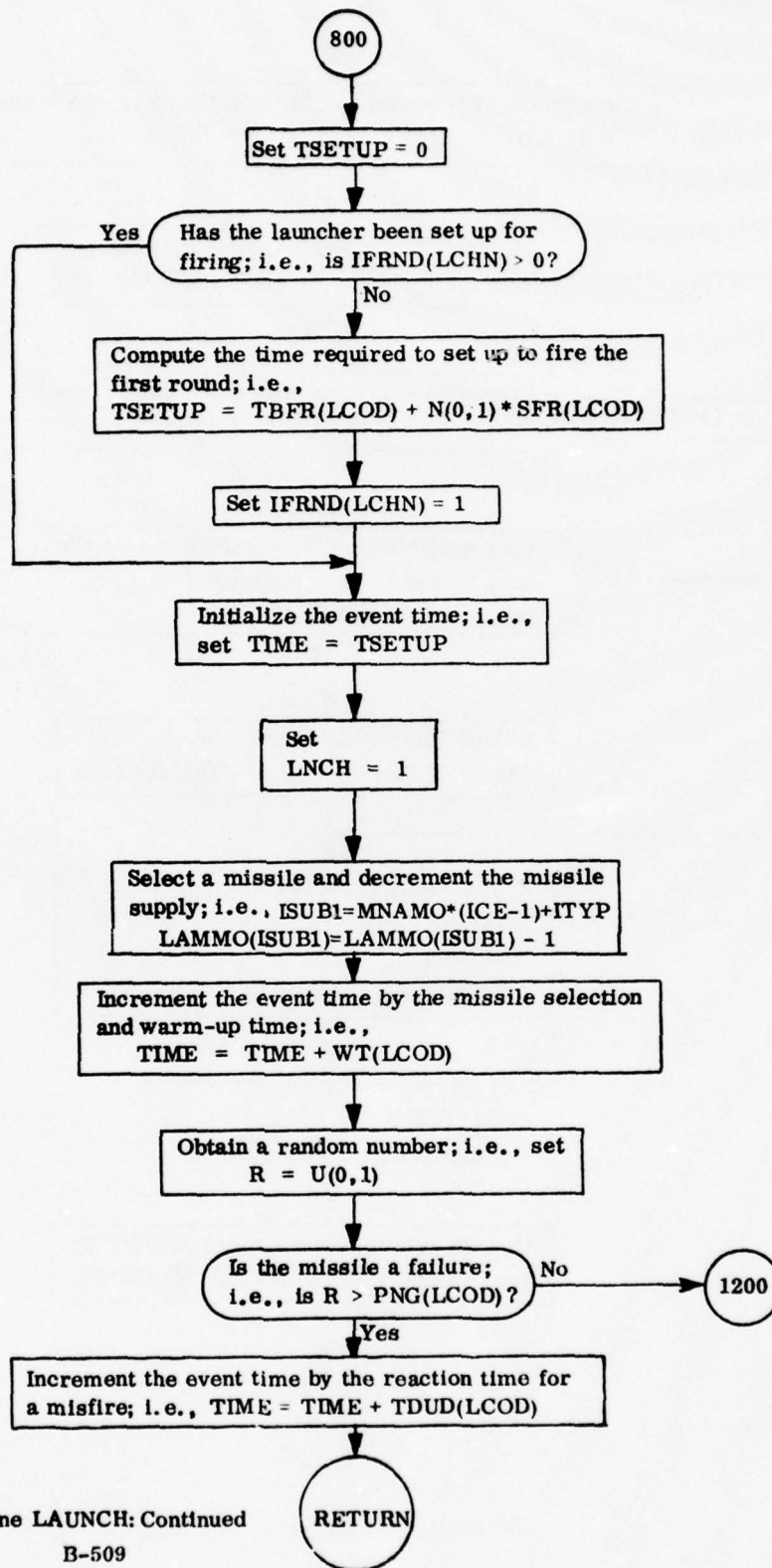
Subroutine LAUNCH: Continued



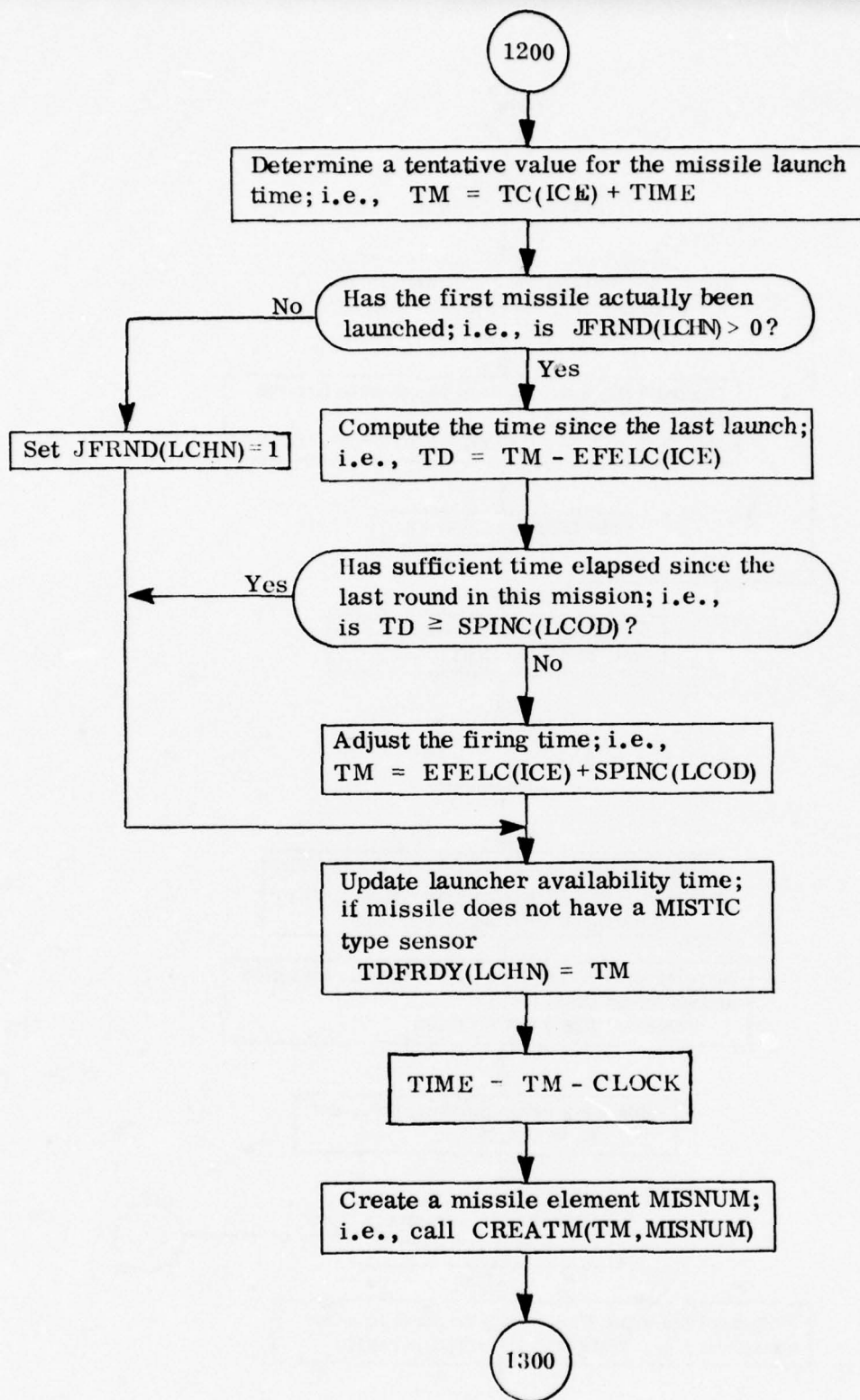
Sburoutine LAUNCH: Continued



Subroutine LAUNCH: Continued



Subroutine LAUNCH: Continued
B-509



Subroutine LAUNCH: Continued

1300

Record data in COMMON/LNSET/ for the launch event; i.e., set

| | |
|------------|--|
| TLN | = TM |
| (XLN, YLN) | = (XE, YE) position coordinates of ICE |
| ZLN | = ELEVATE(XLN, YLN, ICE) |
| NCE | = ICE |
| NFO | = KFO(NF) |
| LFO | = NOBVH(NFO) |
| NUMM | = LCHN |
| IFO | = NFO |
| ITARG | = 0 |
| T | = 0 |
| FINFLG | = 0 |

Decrement the rounds remaining to be fired in this mission; i.e., $NVOLM(NF) - 1 \rightarrow NVOLM(NF)$

Determine the standard deviations of the launcher location error distribution; i.e., set

| | |
|-----|---------|
| SDX | = SDXLI |
| SDY | = SDYLI |

Has the launcher moved during the battle; i.e., $LIMOV(ICE) > 0$?

No

Yes

Revise standard deviations to account for movement; i.e., set

| | |
|-----|---------|
| SDX | = SDXLM |
| SDY | = SDYLM |

Record the errored launch aim point; i.e.,

| | |
|-----|-----------------------|
| XAT | = $R1 * SDX + XD(NF)$ |
| YAT | = $R2 * SDY + YD(NF)$ |

where $R1 \sim N(0,1)$ and $R2 \sim N(0,1)$

Set up data for missile flight; i.e.,
CALL LNBFLT; CALL MICONP

Record data for this firing event for element ICE; i.e., set

| | |
|--------|------|
| IFIR | = 2 |
| EFELCK | = TM |
| LFELTK | = 0 |

RETURN

Subroutine LAUNCH: Continued

B-511

Subroutine LMUSET

PURPOSE: Subroutine LMUSET is used to set and reset the unit activity flag for an aerial maneuver unit.

CALLING SEQUENCE:

CALL LMUSET(NAT,ICNT)

where

NAT = aerial maneuver unit number being processed

ICNT = $\left\{ \begin{array}{l} \text{process control flag} \\ 1 \text{ if the unit and section activity} \\ \text{flags are to be set} \\ 0 \text{ if the unit activity flag is to} \\ \text{be reset} \end{array} \right.$

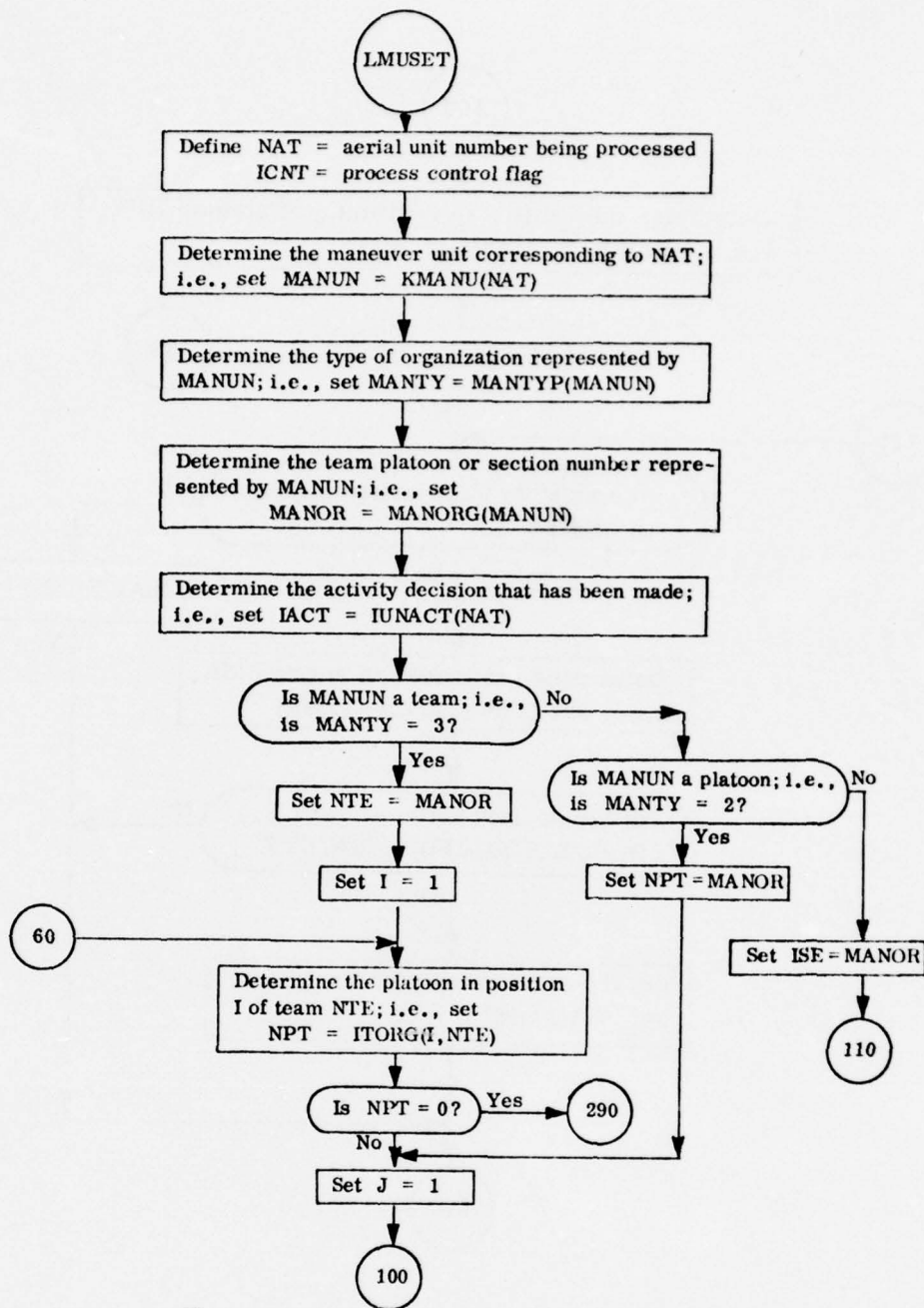
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

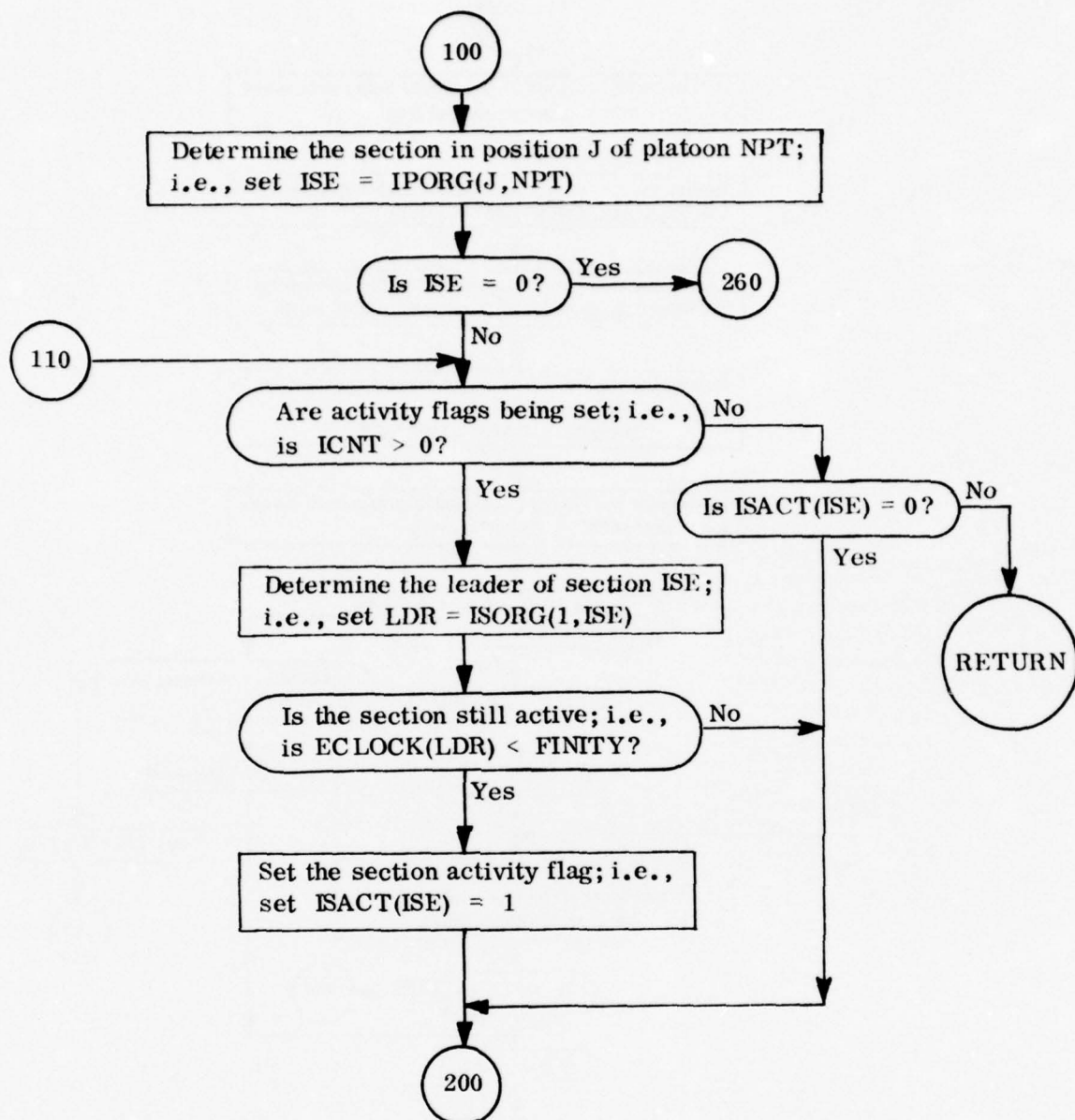
| | | |
|--------|--------|--------|
| ECLOCK | ITORG | MANORG |
| IPORG | IUNACT | MANTYP |
| ISACT | KMANU | NUMBER |
| ISORG | LMUFL | |

SUBROUTINES REQUIRED:

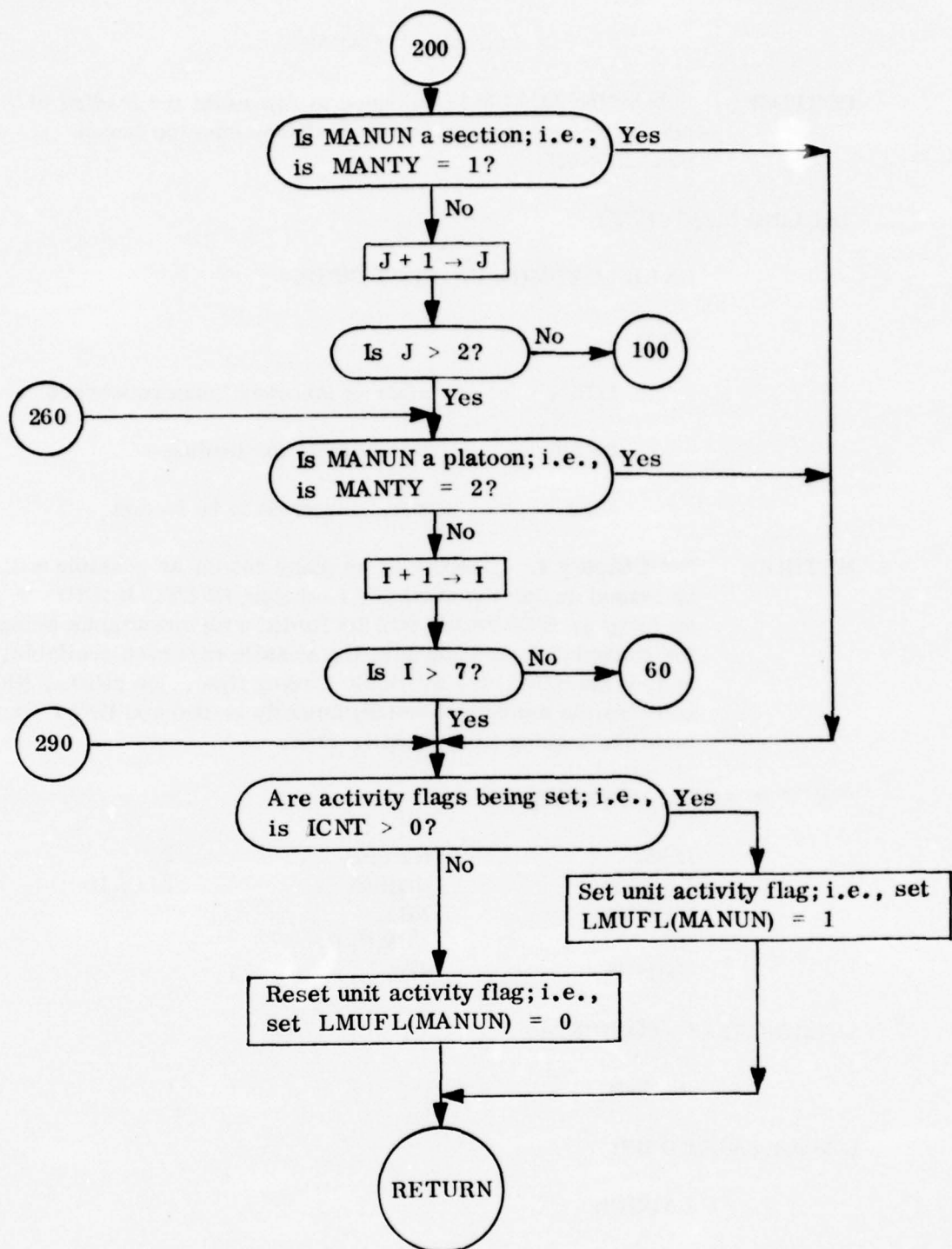
None



Subroutine LMUSET: Setting an Aerial Unit's Movement
Decision Flag



Subroutine LMUSET: Continued



Subroutine LMUSET: Continued

Subroutine LOADM

PURPOSE: Subroutine LOADM is designed to represent the loading of MISTIC missiles from stored positions onto the launch mechanism.

CALLING SEQUENCE:

CALL LOADM(LCHN,DELT,NRD)

where

LCHN = number of launcher being processed

DELT = time available for loading

NRD = number of rounds to be loaded

METHOD: See Chapter 3. If $NRD = 0$, as many rounds as possible will be loaded during the available load time DELT. If $NRD > 0$, as many as NRD rounds will be loaded with constraints being the capacity of the launcher, the missile reserves available, and, if specified, the available loading time. On return, NRD contains the number of rounds actually loaded and DELT contains the loading time actually used.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|-------|
| IFMC | NMLIM | TBL |
| LAMMO | NOBVH | TLOAD |
| LWCOD | NRL | |
| NM | NUMBER | |
| NMISUN | SDL | |

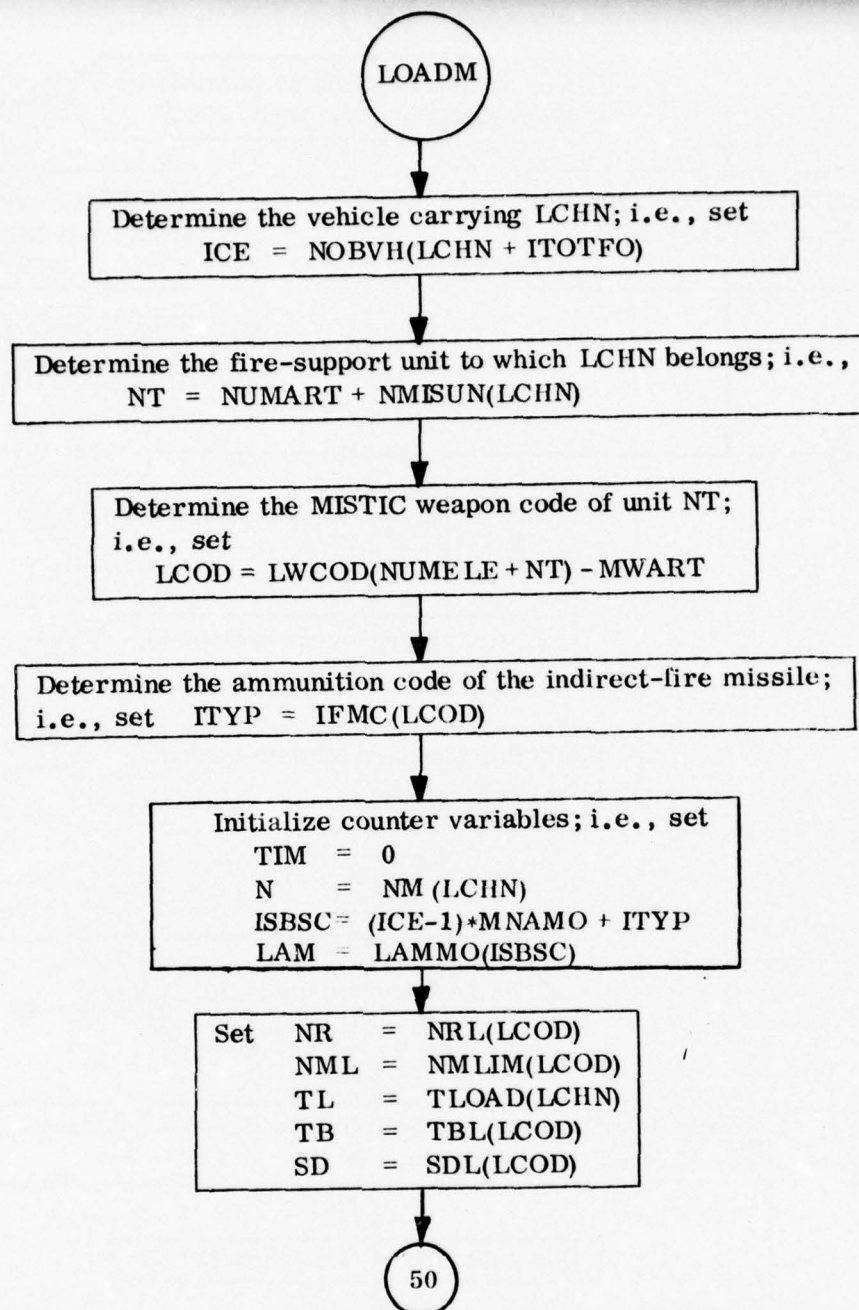
SUBROUTINES REQUIRED:

RANND

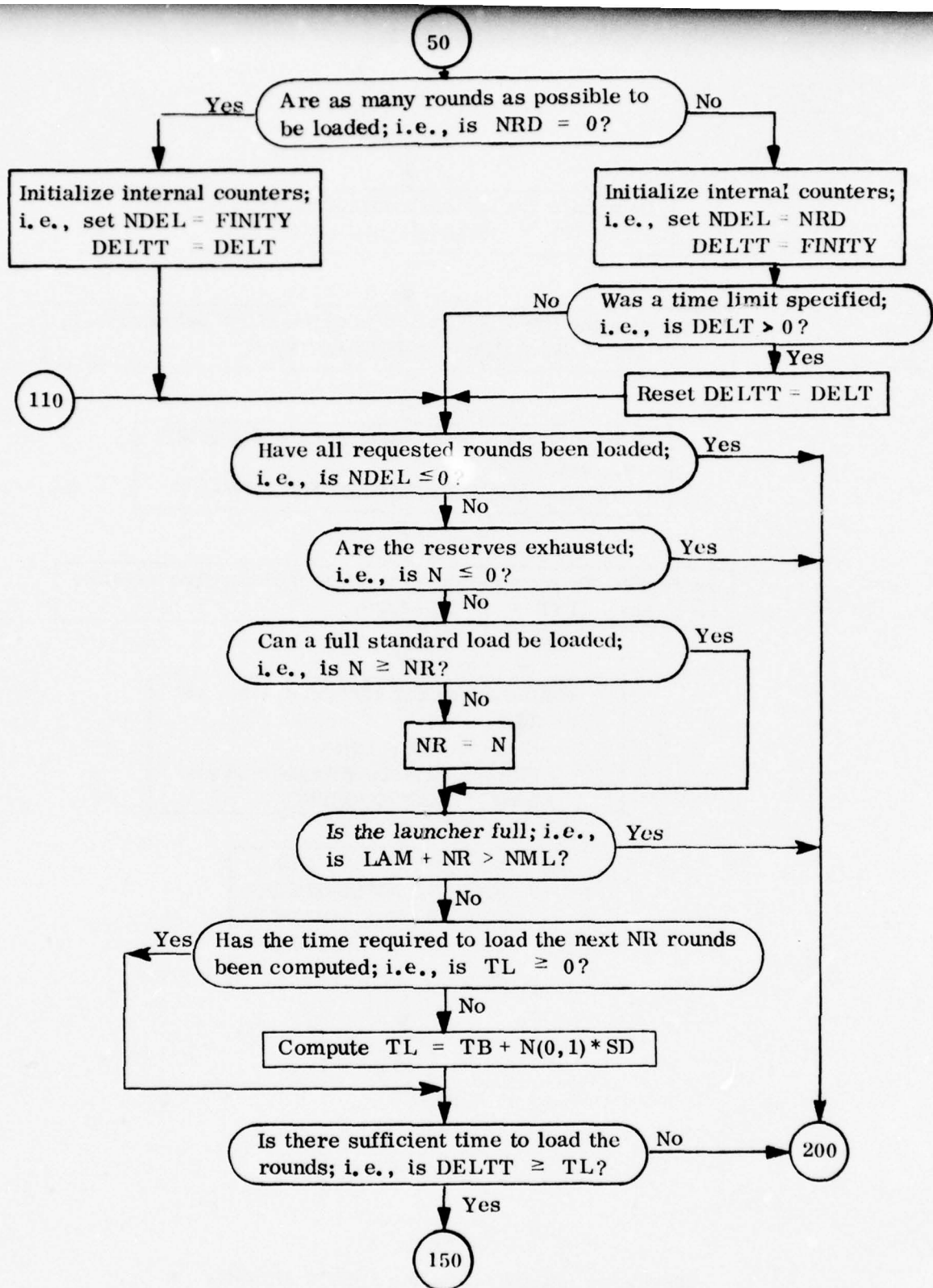
LOADM CALLED BY:

LAUNCH

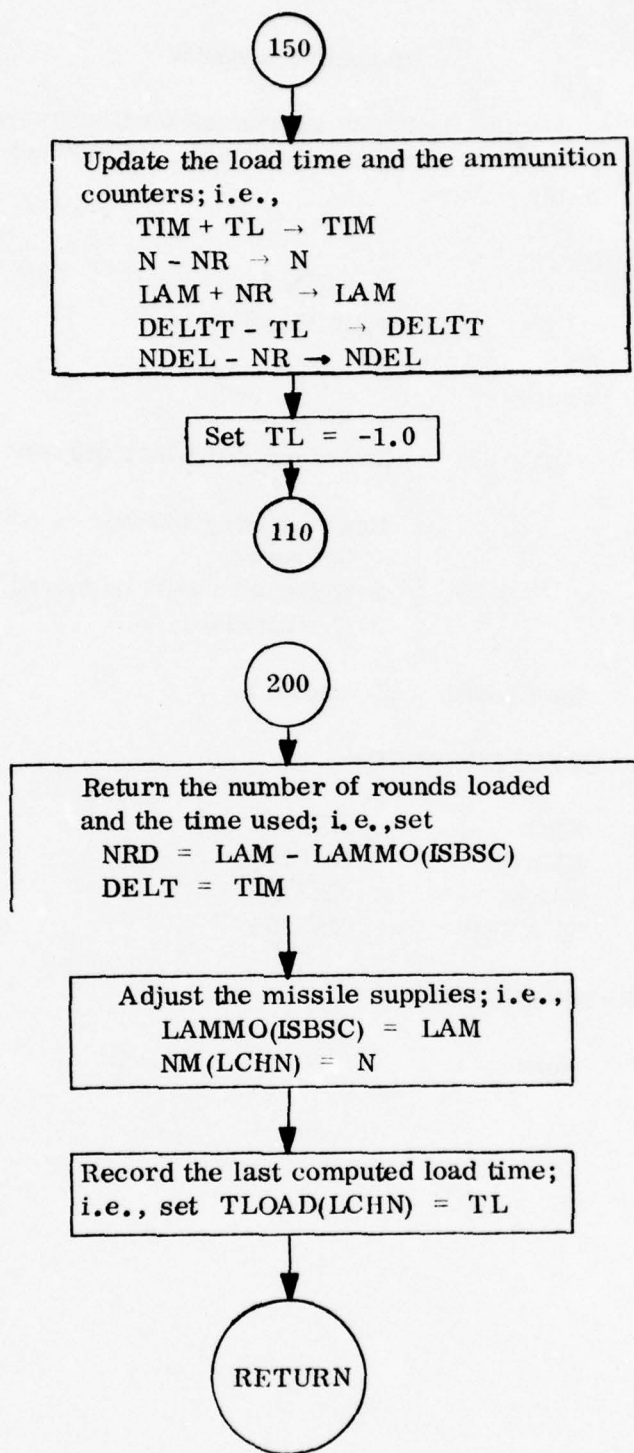
LENGTH: $4E0_{16} - 8421_{10}$ bytes



Subroutine LOADM: Loading MISTIC Missiles



Subroutine LOADM: Continued



Subroutine LOADM: Continued

Subroutine LOIMOV

PURPOSE: Subroutine LOIMOV determines whether an aerial maneuver unit should change the position of its indirect-fire MISTIC loiter station.

CALLING SEQUENCE:

CALL LOIMOV(NAT,IMOV)

where

NAT = aerial unit for which decision is desired

IMOV = $\left\{ \begin{array}{l} \text{flag indicating whether or not station should} \\ \text{be moved} \\ 1 \text{ if station should be moved} \\ 0 \text{ if otherwise.} \end{array} \right.$

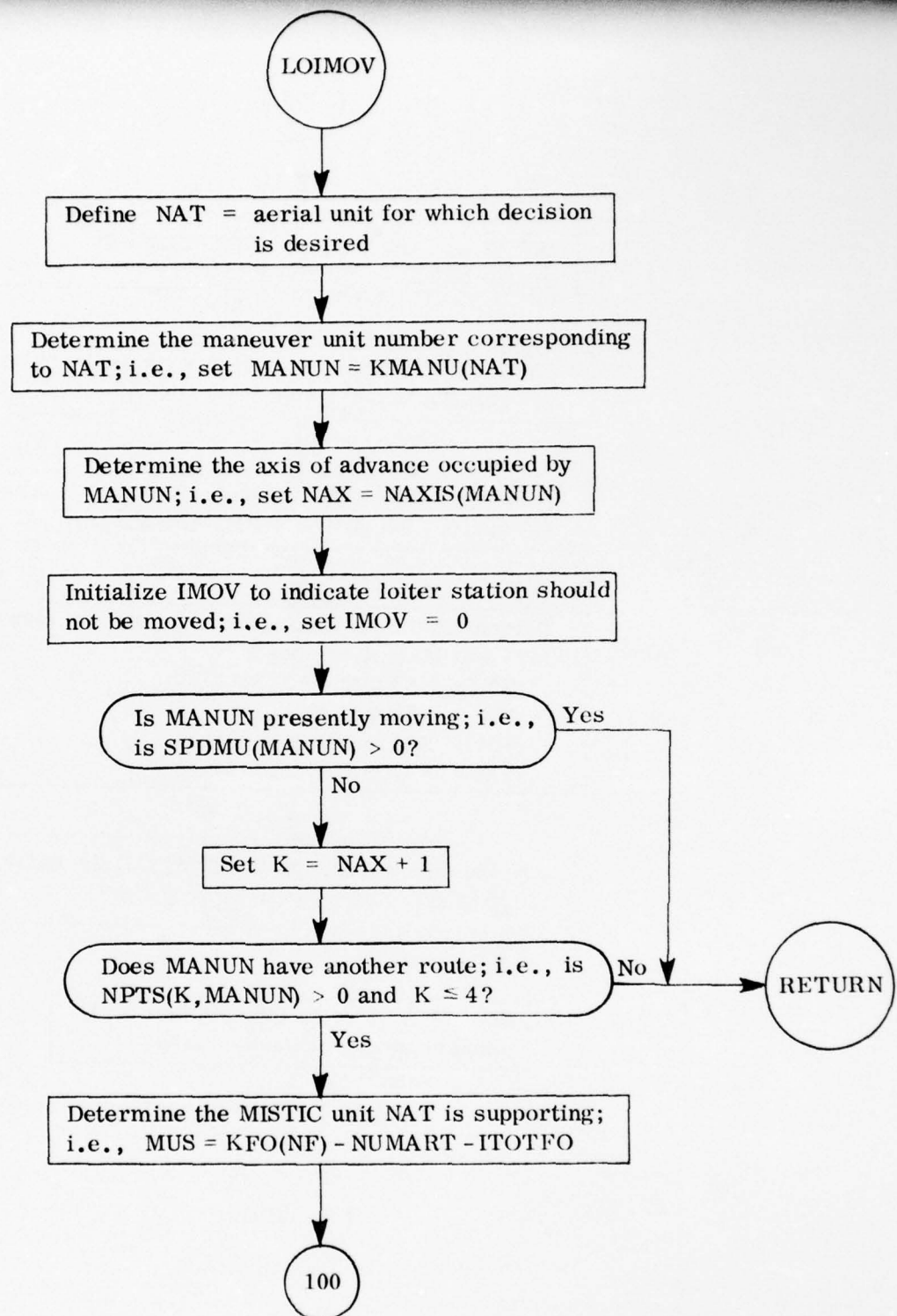
METHOD: See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

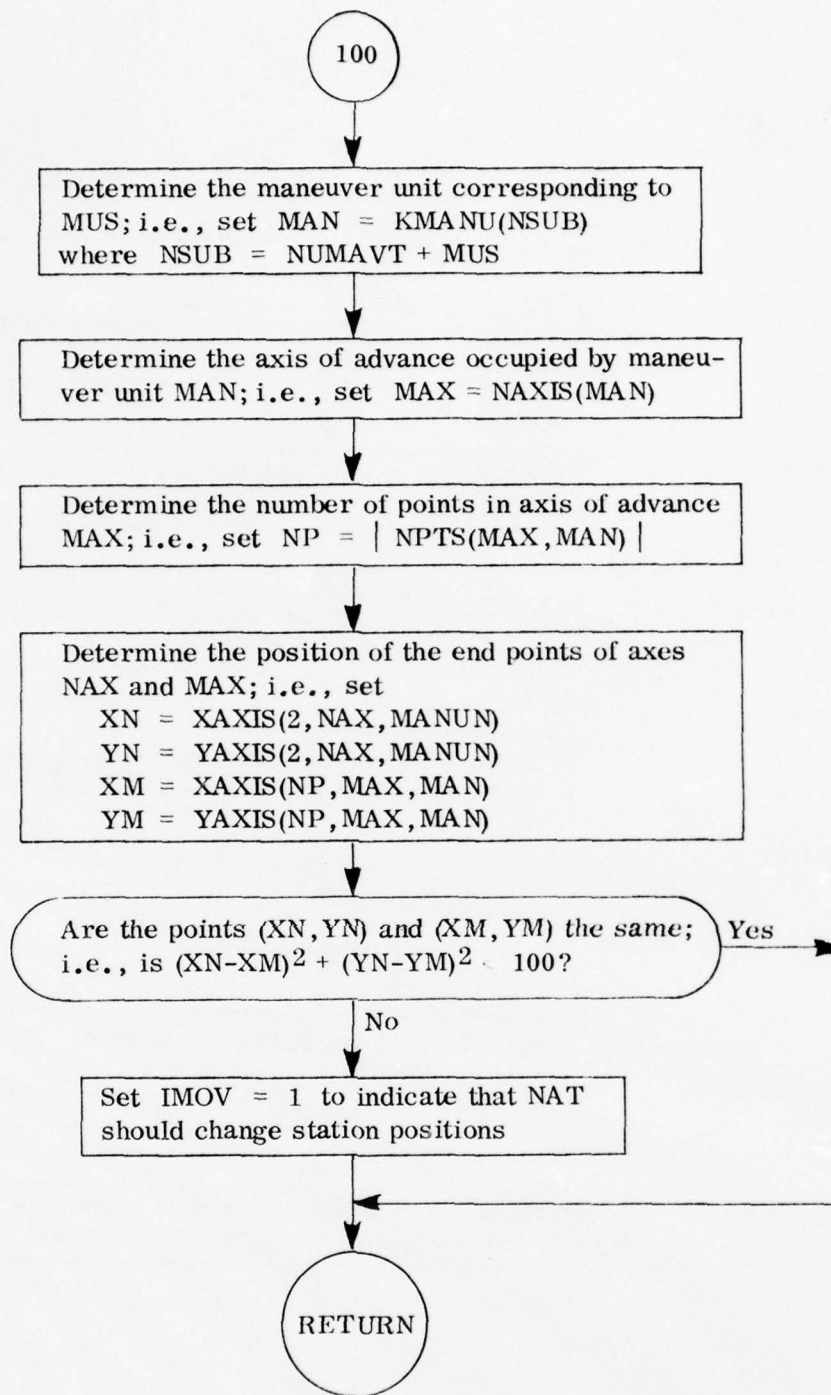
| | |
|--------|-------|
| KFO | NPTS |
| KMANU | SMDMU |
| NAXIS | XAXIS |
| NUMBER | YAXIS |

SUBROUTINES REQUIRED:

None



Subroutine LOIMOV: Determining Whether an Aerial Unit Should Change Loiter Station Positions



Subroutine LOIMOV: Continued

Subroutine LOIPOS

PURPOSE: Subroutine LOIPOS determines the position of the next loiter station to be occupied by an aerial maneuver unit performing MISTIC indirect-fire support.

CALLING SEQUENCE:

CALL LOIPOS(NAT)

where

NAT = aerial maneuver unit number being
processed

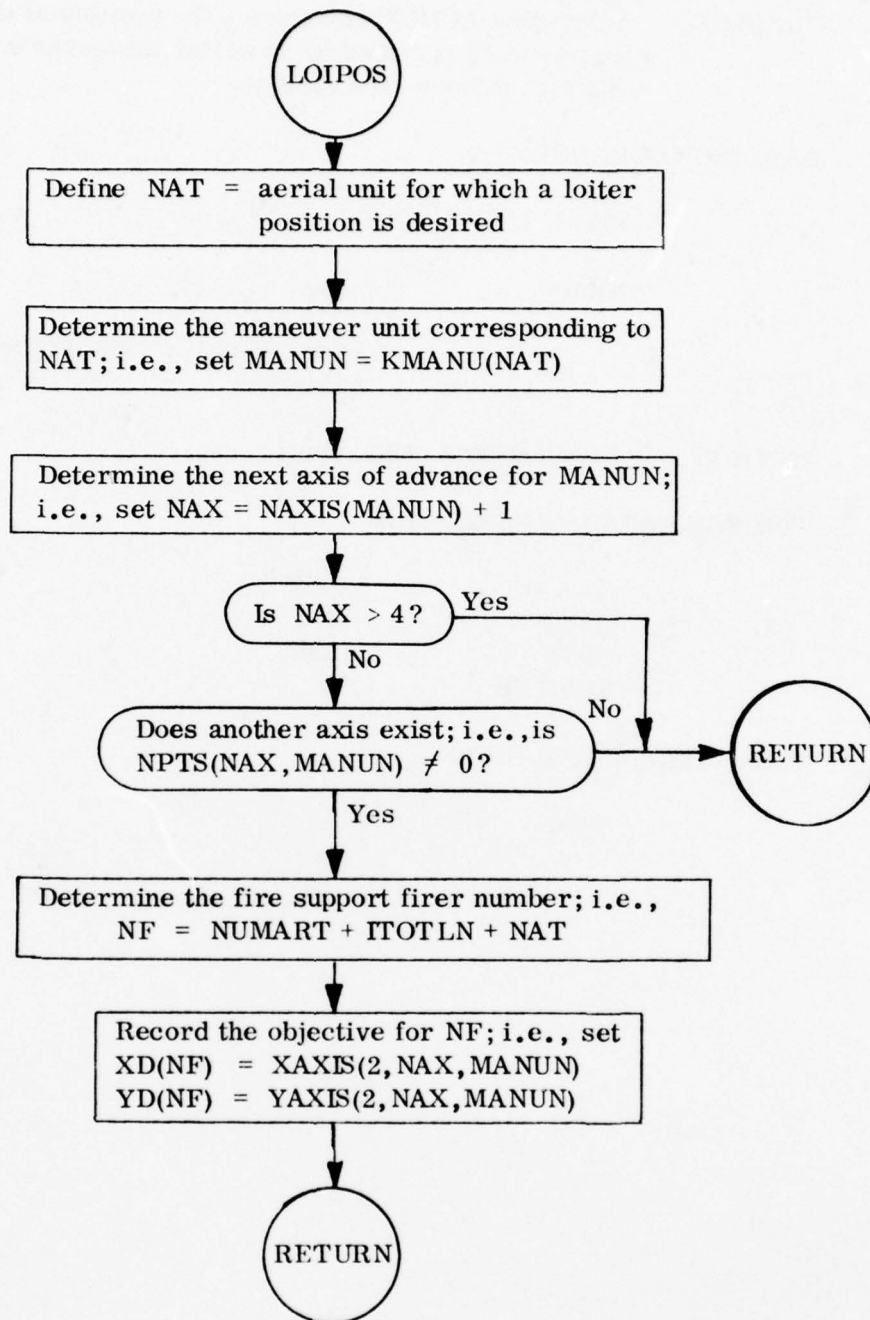
METHOD: See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

| | |
|--------|-------|
| KMANU | YAXIS |
| NAXIS | YD |
| NPTS | XAXIS |
| NUMBER | XD |

SUBROUTINES REQUIRED:

None



Subroutine LOIPOS: Selecting an Aerial Unit's Loiter Station Position

Subroutine LOOK

PURPOSE: To examine organization of the maneuver units to decide whether to mount or dismount.

CALLING SEQUENCE:

CALL LOOK(IPAR)

where:

$$\text{IPAR} = \begin{cases} 1 \sim \text{signal to mount} \\ 2 \sim \text{signal to dismount} \end{cases}$$

METHOD: See Chapter 9, Volume 1, RF 2376 FR-70.

COMMON AREAS REFERENCED:

ICECOM
LCREW
LCSWFN
LMANU
LSEC

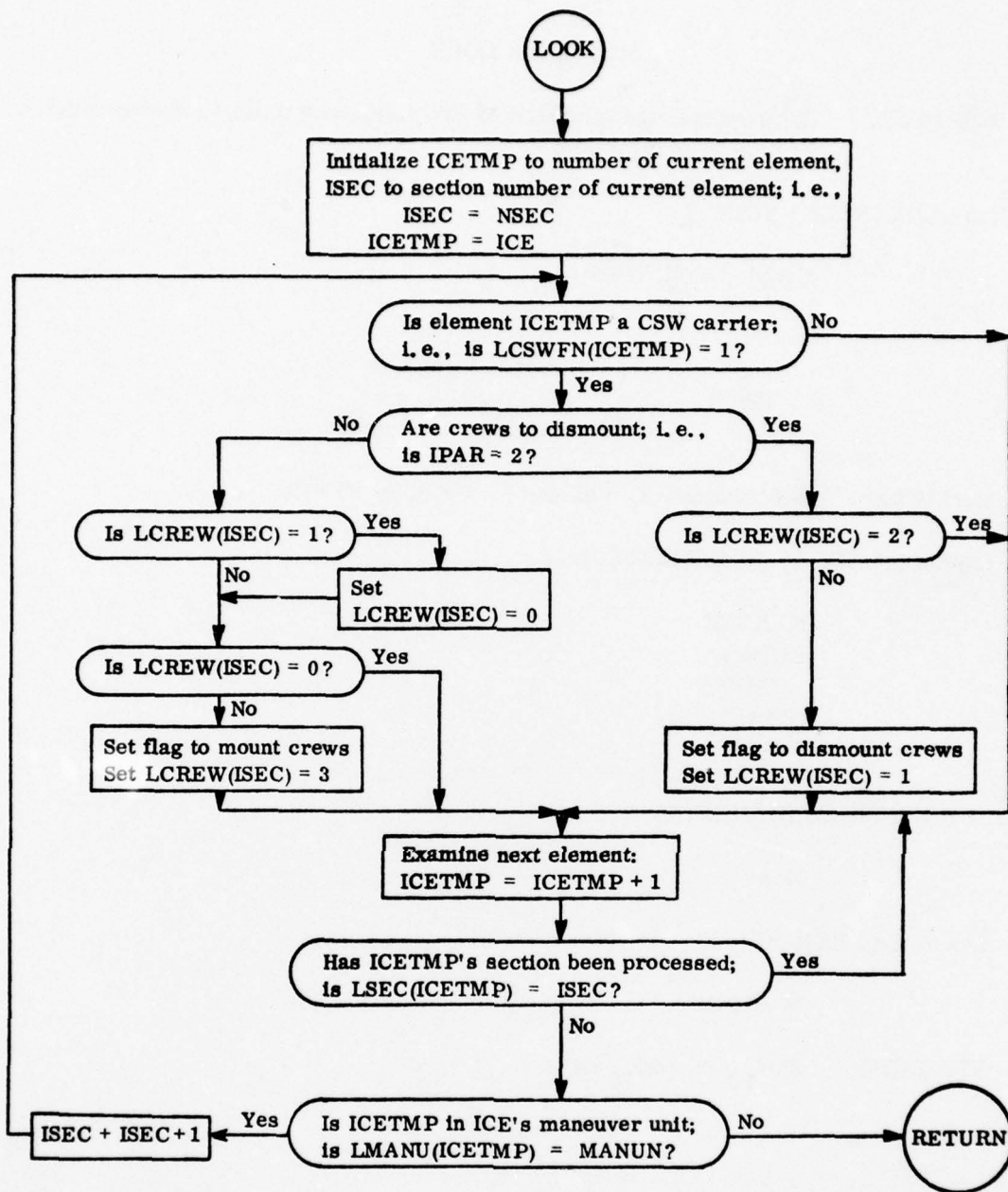
SUBROUTINES REQUIRED:

None

LOOK CALLED BY:

MVCON

STORAGE: $34E_{16} = 846_{10}$ bytes



Subroutine LOOK: Determine if CSW Elements
Are to Mount or to Dismount

Program MAIN

PURPOSE: The DYN-TACS X main program performs initialization required to start a simulated battle, supervises each simulated event, and controls the activities of a current element during an event.

CALLING SEQUENCE: None

METHOD: At the start of a battle and prior to event sequencing, the DYN-TACS X main program performs various initialization procedures. For example, the formation types of attacking maneuver units are determined and the elements within these units are positioned in the formations. Line-of-sight and detection arrays are initialized, and the initial clock time for each element is determined. These initialization procedures are performed by routines called from the main program.

Event sequencing is then performed by a looping procedure which retrieves a new current element for each iteration. Control is passed to the appropriate section of the program for each type of element. Fire support elements, consisting of forward observers, fire support coordinators, ground-to-air communicators, fire support radio net elements, MISTIC indirect-fire launchers, artillery firing batteries, aerial unit decision elements and artillery intelligence centers, initiate calls to an appropriate fire support routine, depending upon the type of fire support element being processed. Missile elements are passed to the missile flight routine to represent their movement and terminal effects, while special elements are passed to a routine which generates summary output giving an overall look at the progress of the engagement. Vehicular elements, consisting of armored vehicles, crew-served weapons, crew-served weapons carriers, air defense weapons, and helicopters, are processed through a number of routines. First, intelligence and communications are processed and element description data are retrieved. The Fire Controller models then determine if an element should fire. If the element will fire, the Firing Models calculate the time required and the results of the fire. Should a casualty occur, it is recorded. The Movement Controller models determine if the element should move, and if so, the Movement Model executes the movement. The element description data are then restored to general storage, including any changes which have occurred.

After each event, the element is returned to the Sequence Controller which increments the current element's clock and

establishes a new current element. The event looping continues until a battle is completed.

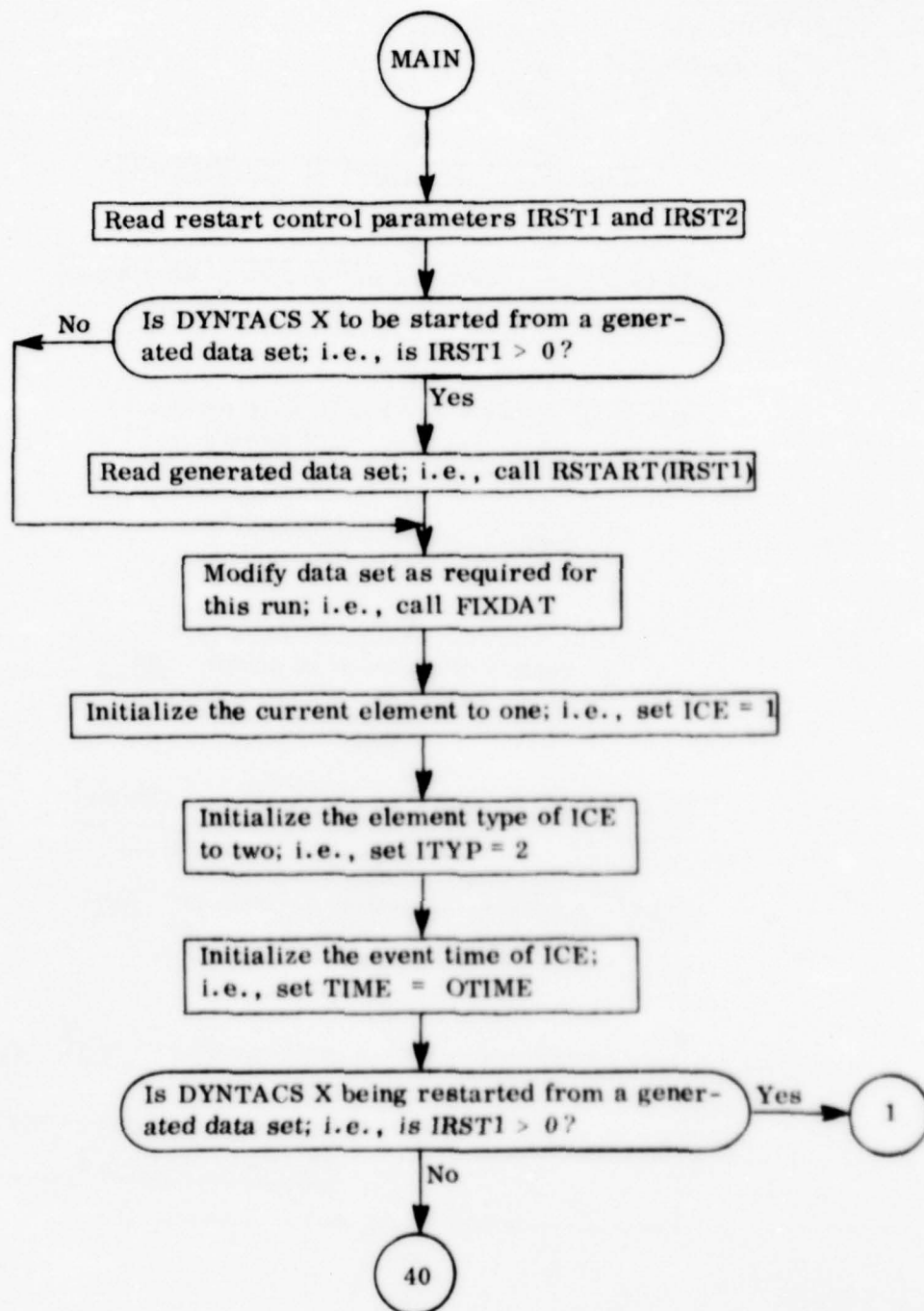
The DYN TACS X main program also incorporates procedures that permit the user to periodically record (at each summary output) the entire simulation data base on a tape or disc. Such data bases reflect the state of the battle at the time the data are recorded. Should this option be used, it is possible to restart the simulation later using one of the generated data bases instead of the data base provided by the initial data set. Under such conditions, no initialization procedures are executed in the main program prior to event sequencing. Instead, the indicated data base is merely read and event sequencing commences. Chapter 9 of Volume 1 presents a detailed description of the restart procedure.

COMMON AREAS REFERENCED:

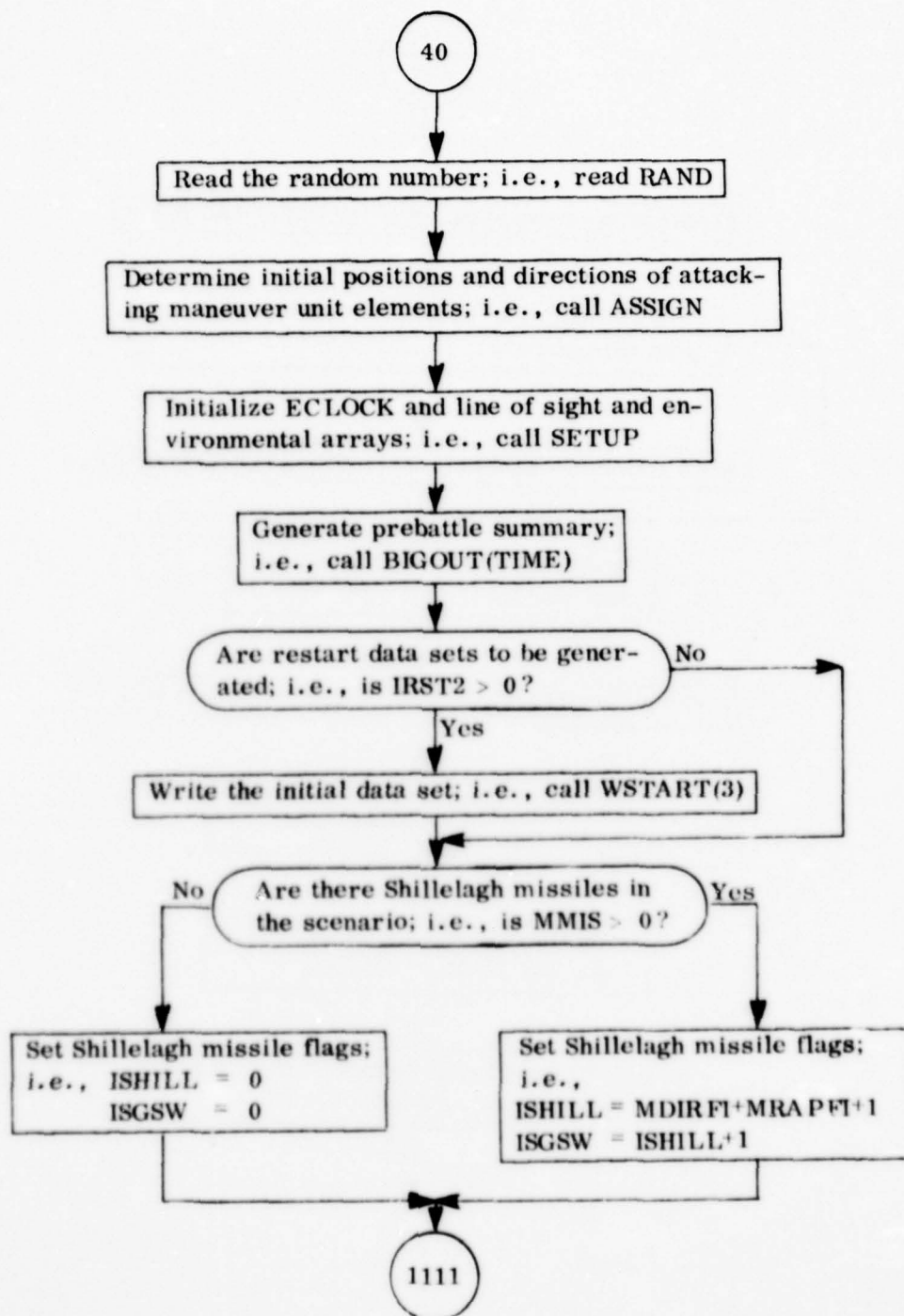
| | | | |
|--------|--------|--------|--------|
| ECLOCK | ISHILL | LHICE | MISAVE |
| EMICR | ISORG | LKILL | MOVPAR |
| IADCE | ITCOM | LNSET | NUMBER |
| IAMMO | LCPE | LWCOD | RANDOM |
| IANYPT | LCREW | MAINPR | SPDMU |
| ICECOM | LCSWFN | MANLDR | STIME |
| IRAPUP | LFUNC | MAXWEP | TMNEUT |

SUBROUTINES REQUIRED:

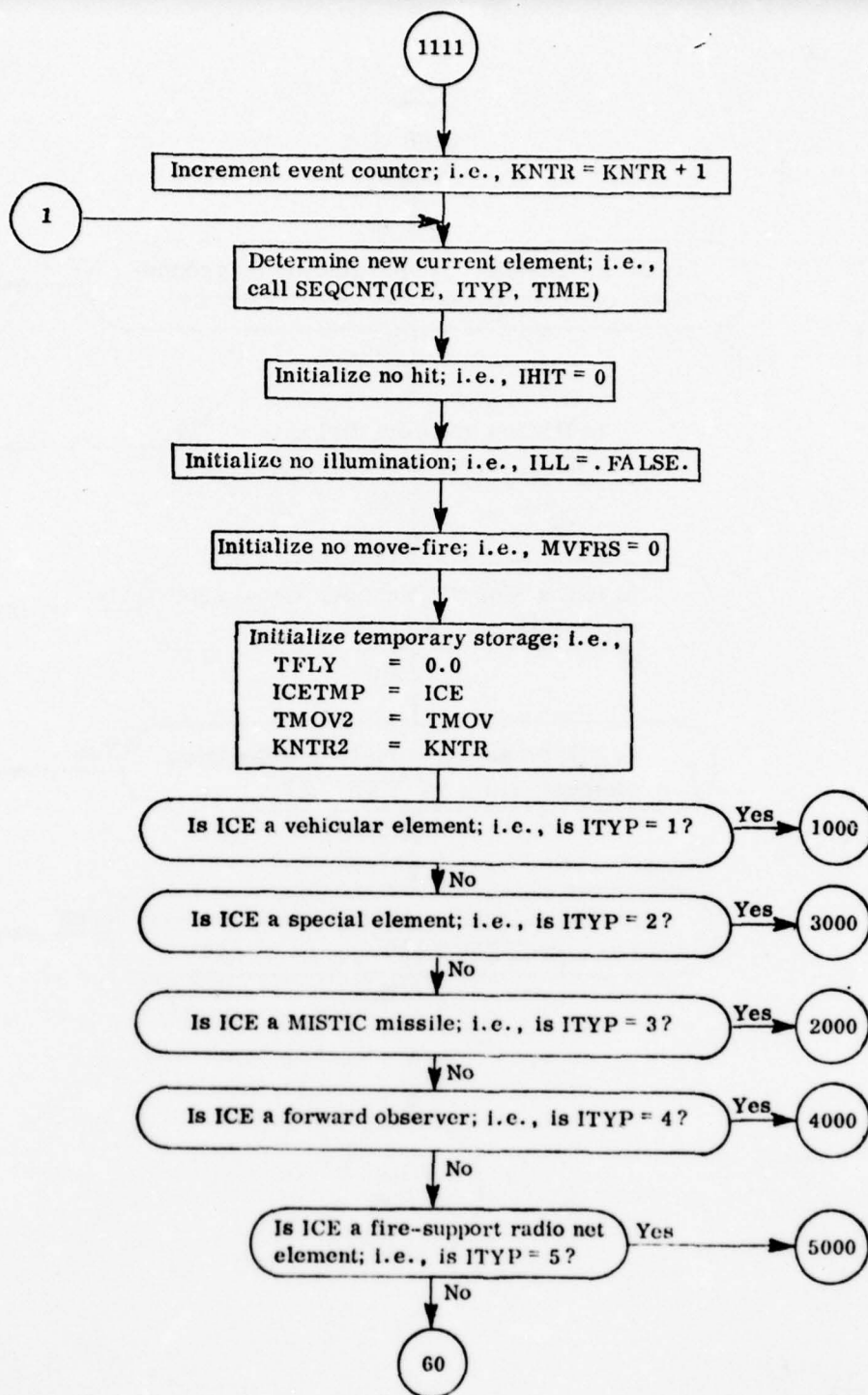
| | | | |
|--------|--------|--------|--------|
| ADGCON | CSWCAS | GETHEL | MVTEST |
| AFB | CSWCON | HELCON | NEUTIM |
| AFDC | ELVATE | HELMOV | PUTICE |
| AFO | ERROR | HFIRE | RAPUP |
| AFSC | FIRCON | HRAUP | RSTART |
| AIC | FIRMOD | IEXP | SEQCNT |
| AIRFB | FXDAT | INTELL | SETUP |
| ASSIGN | FLIGHT | LAUNCH | SETLOS |
| BIGOUT | FSCHEK | MFB | SHILLY |
| CASELE | FTIME | MOV | WSTART |
| COM | GETICE | MVCON | |



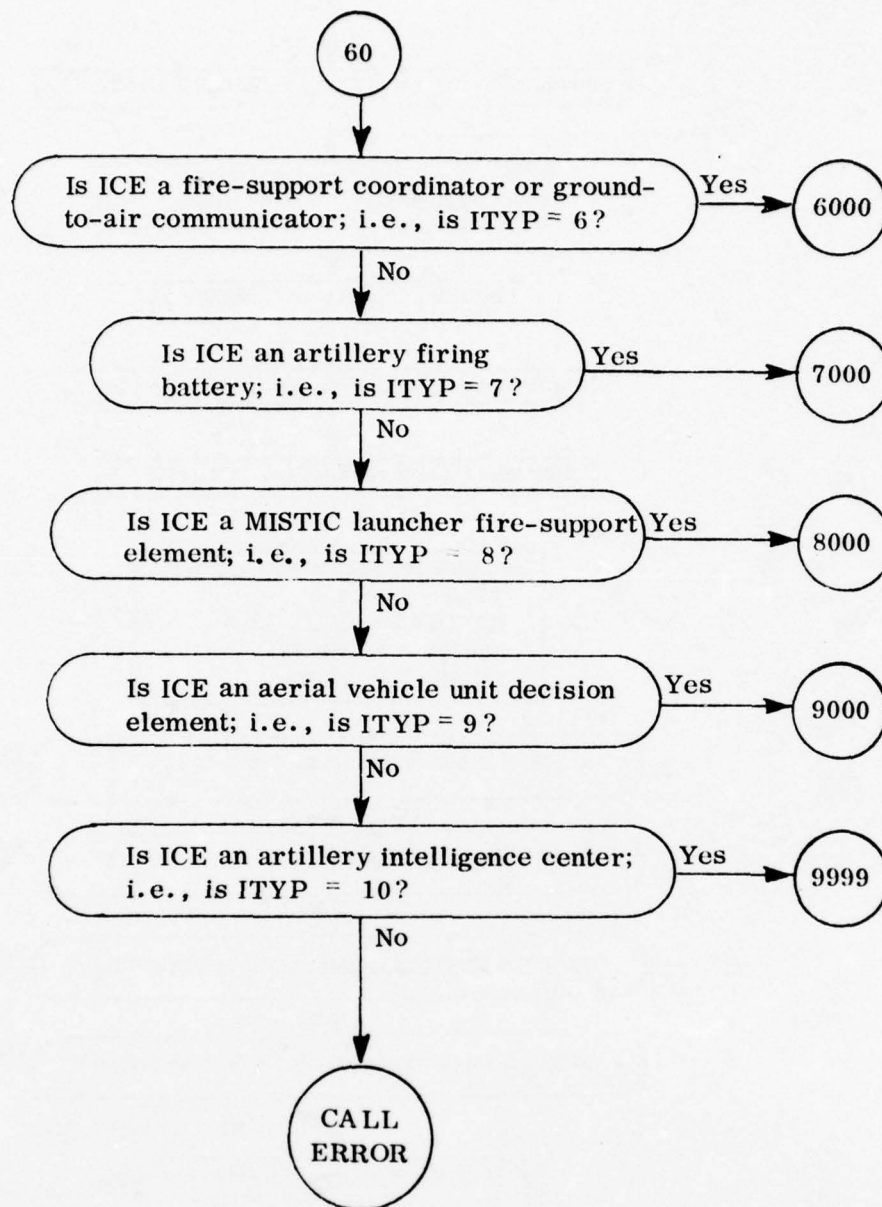
DYN TACS Main Program



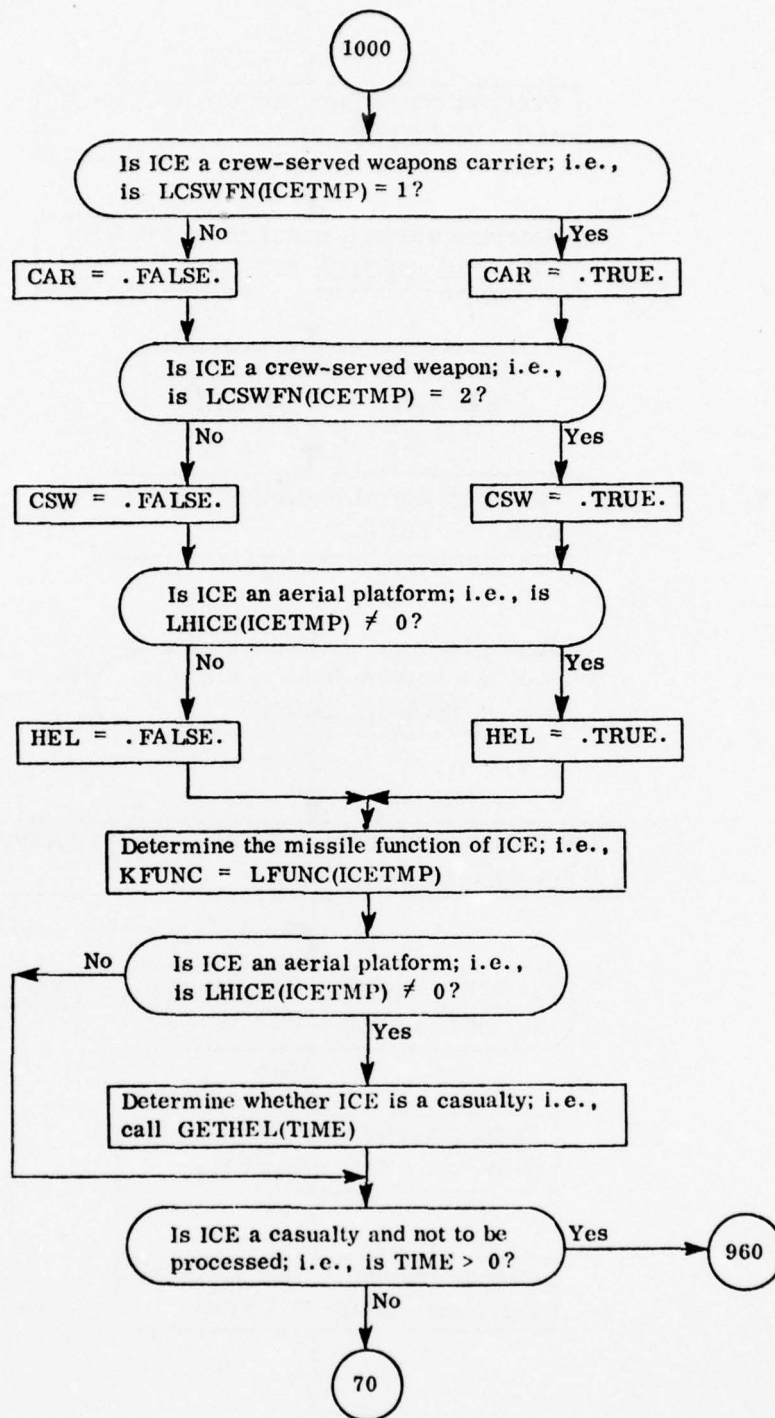
DYN TACS Main Program: Continued



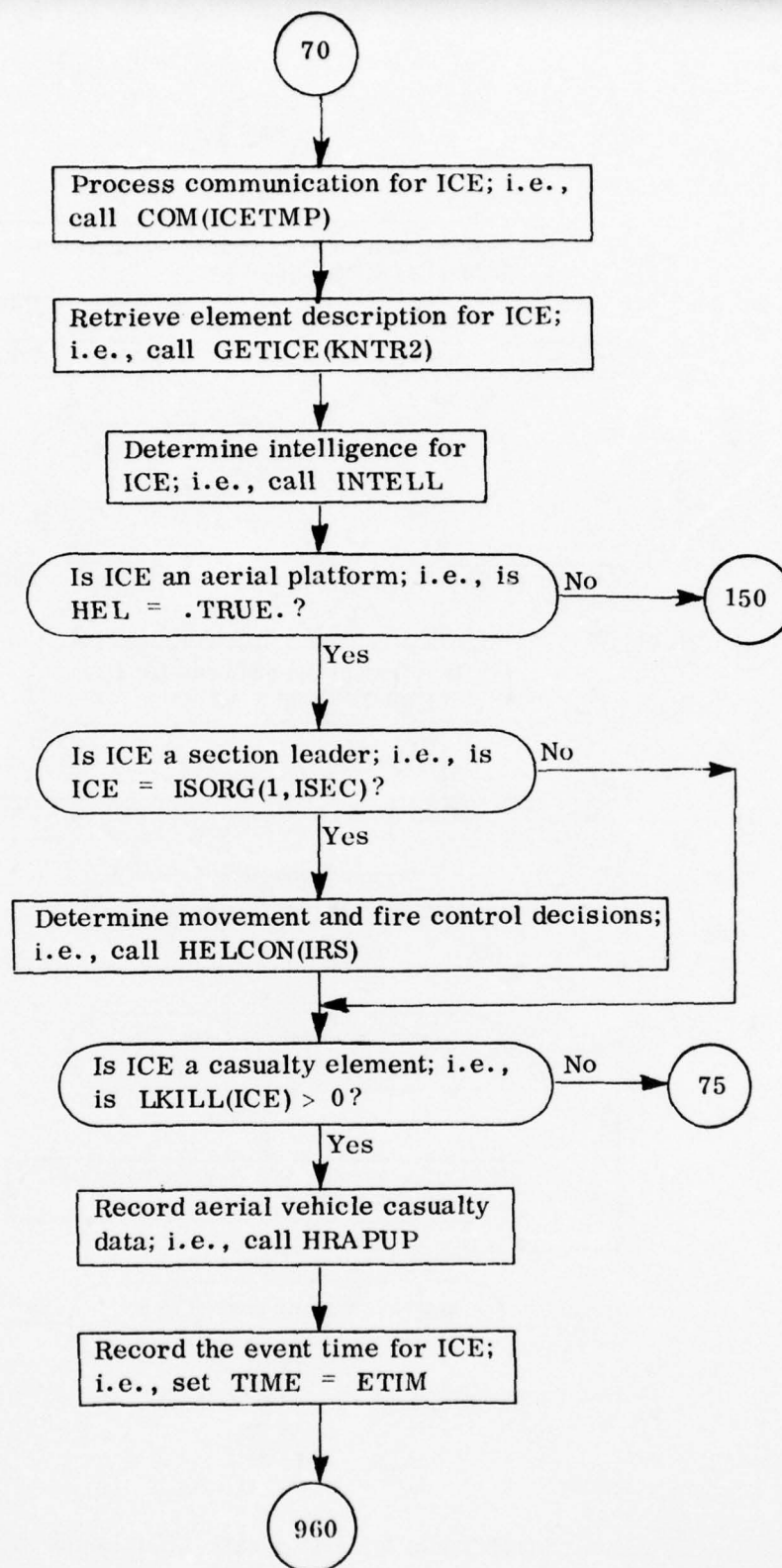
DYNTACS Main Program: Continued



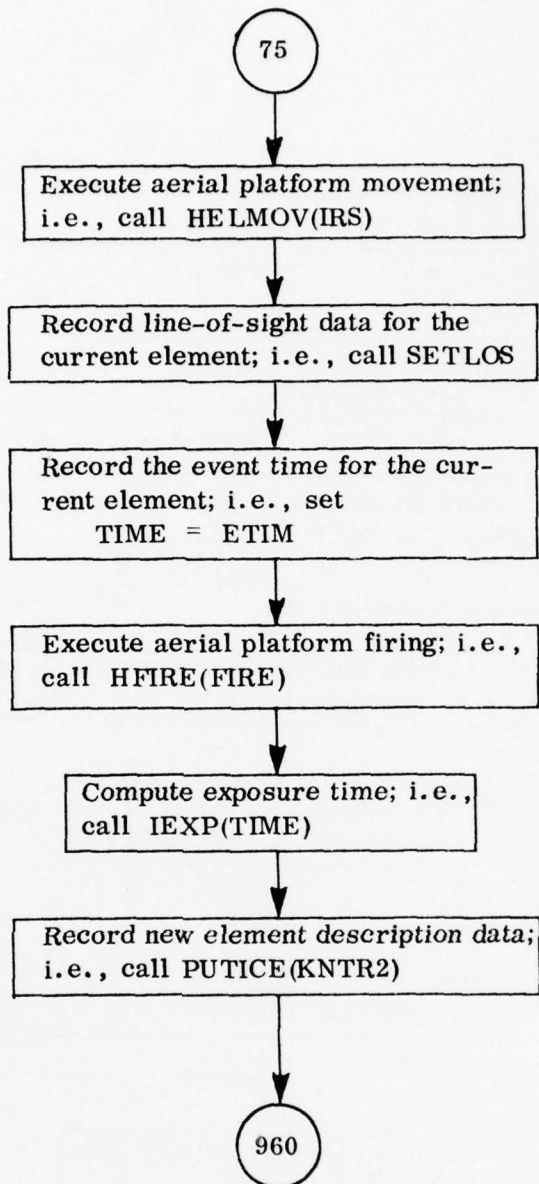
DYNTACS Main Program: Continued



DYN-TACS Main Program: Continued



DYN-TACS Main Program: Continued



DYNTACS Main Program: Continued

AD-A040 054

OHIO STATE UNIV COLUMBUS SYSTEMS RESEARCH GROUP
EXTENSION TO THE LAND COMBAT MODEL (DYNCOM). VOLUME 2, SECTION --ETC(U)
DEC 71 G M CLARK, R J WILHELM
RF-2995-FR 71-2(U)-SEC-2

F/G 15/7

DAAH01-70-C-0713

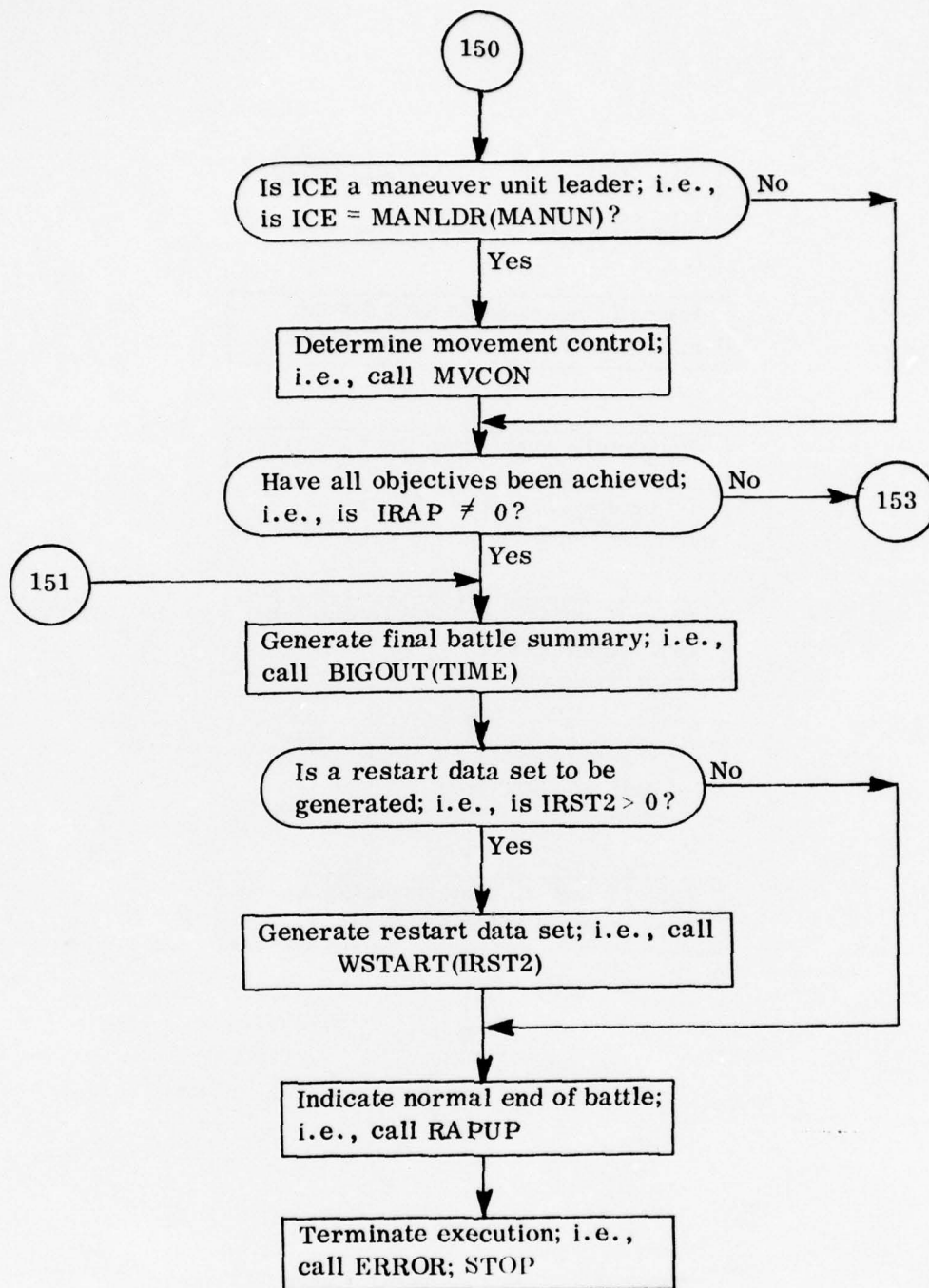
NL

UNCLASSIFIED

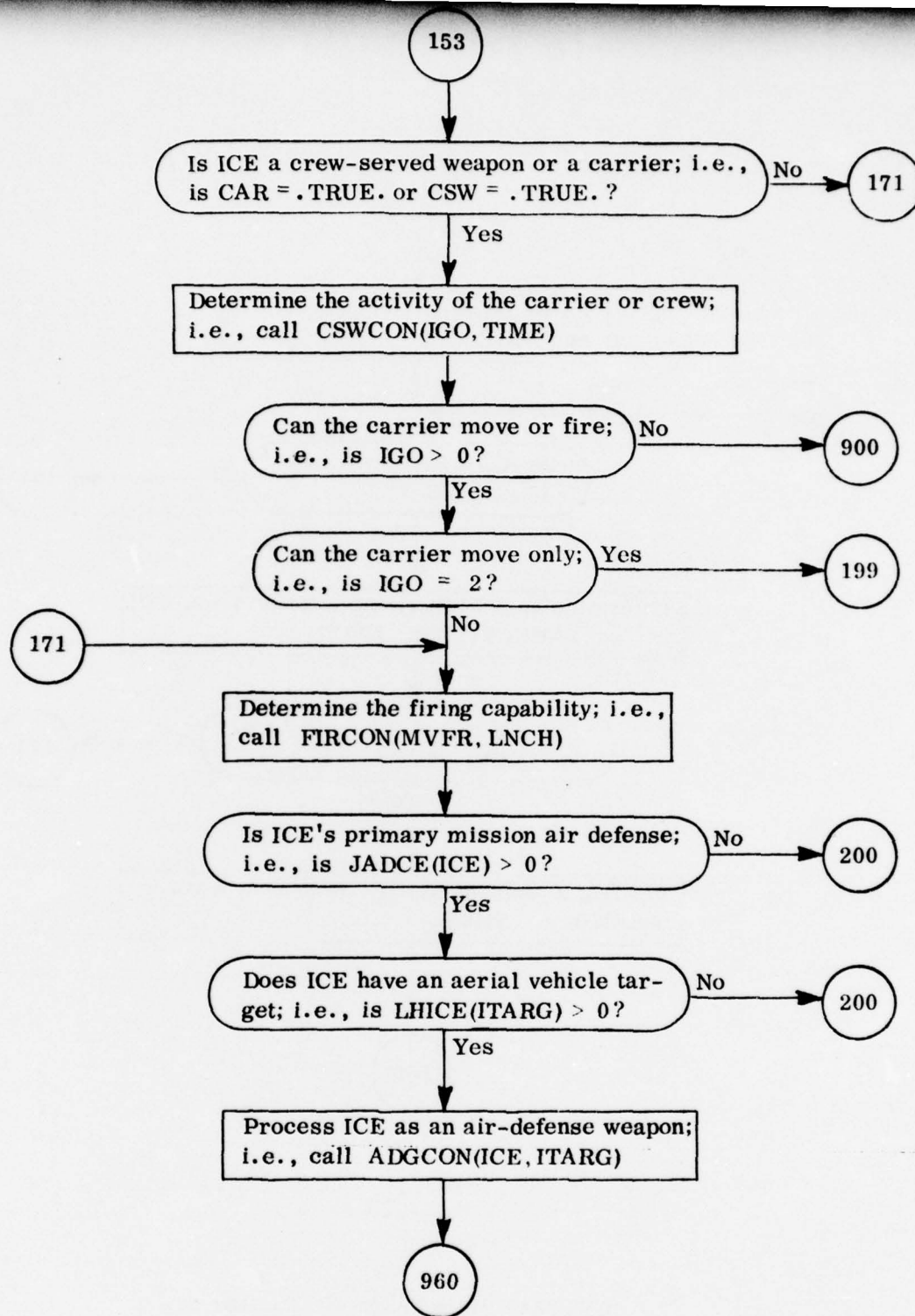
4 OF 6
AD
A040 054



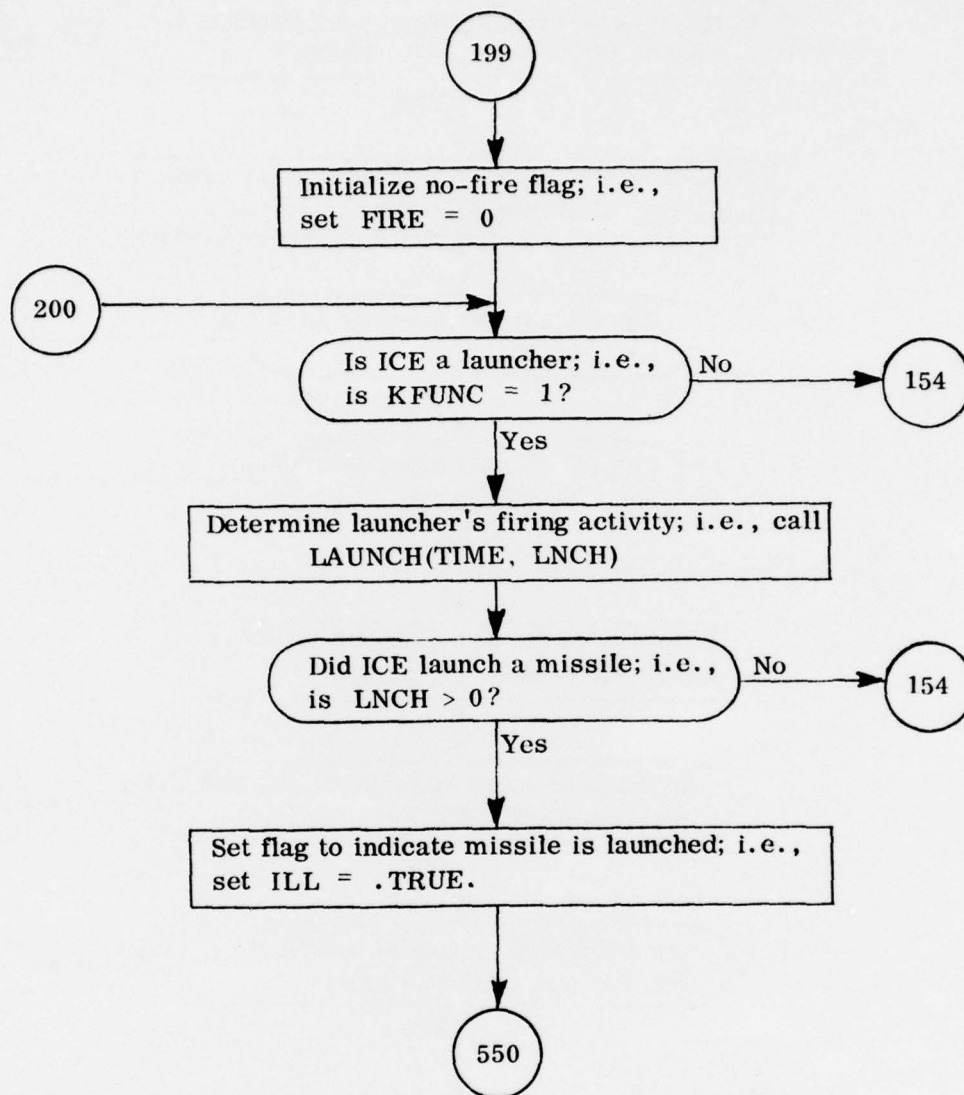




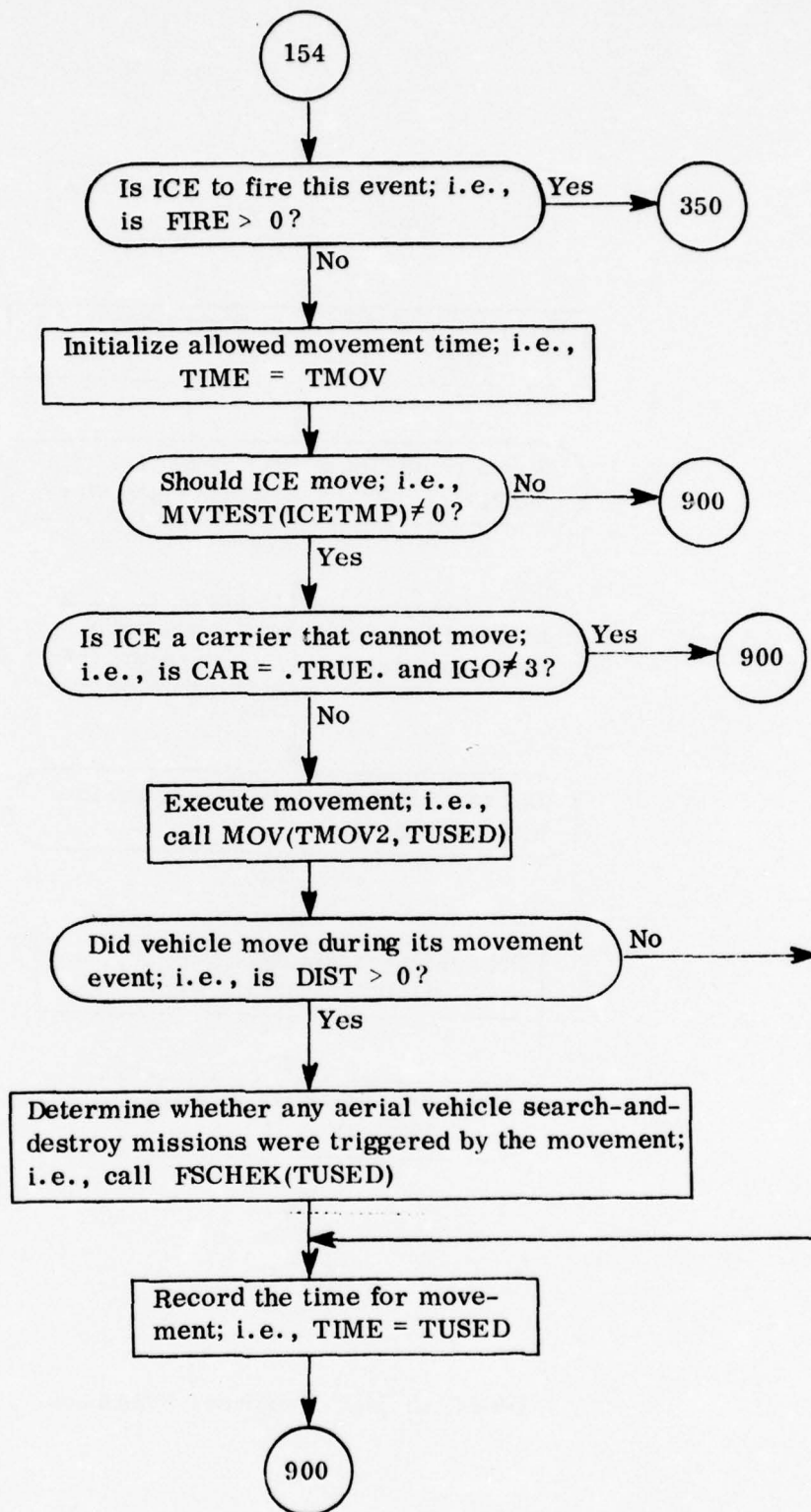
DYNTACS Main Program: Continued



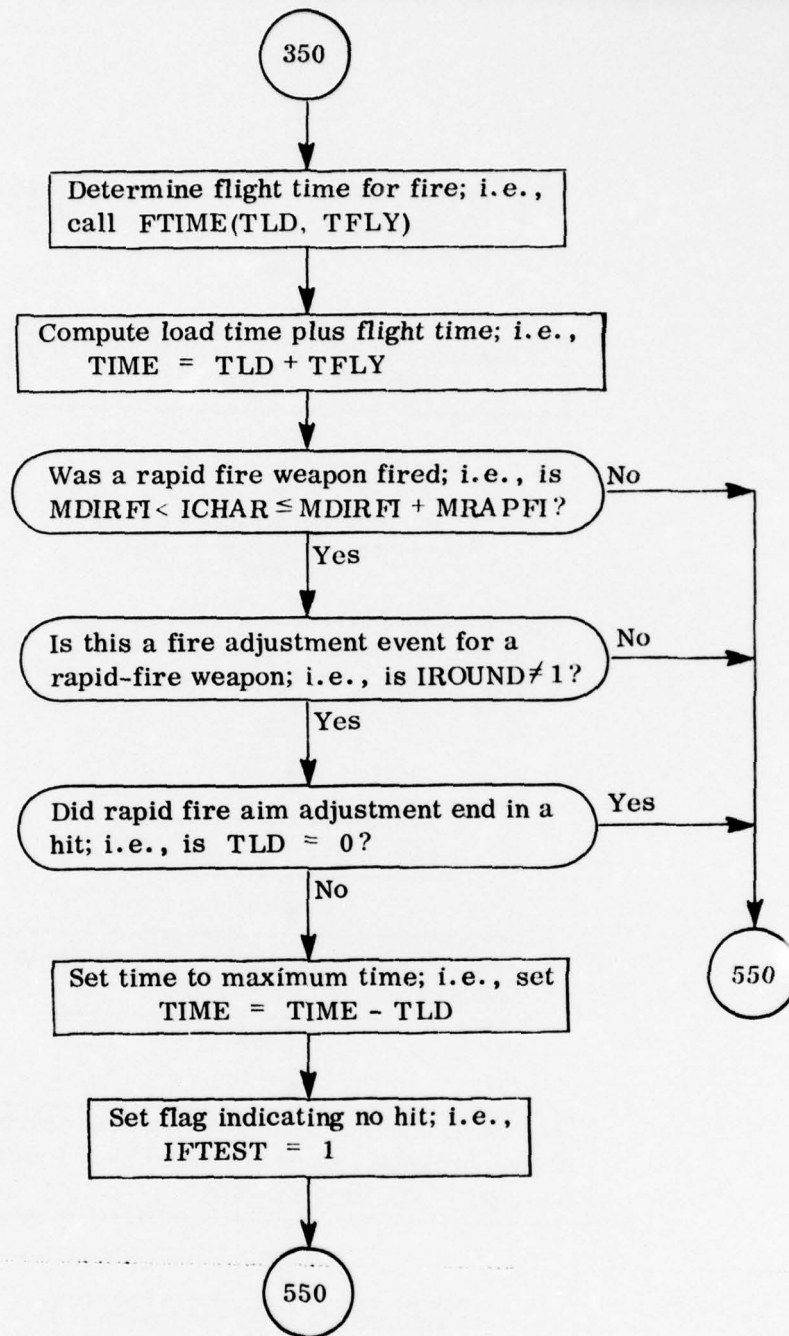
DYNTACS Main Program: Continued



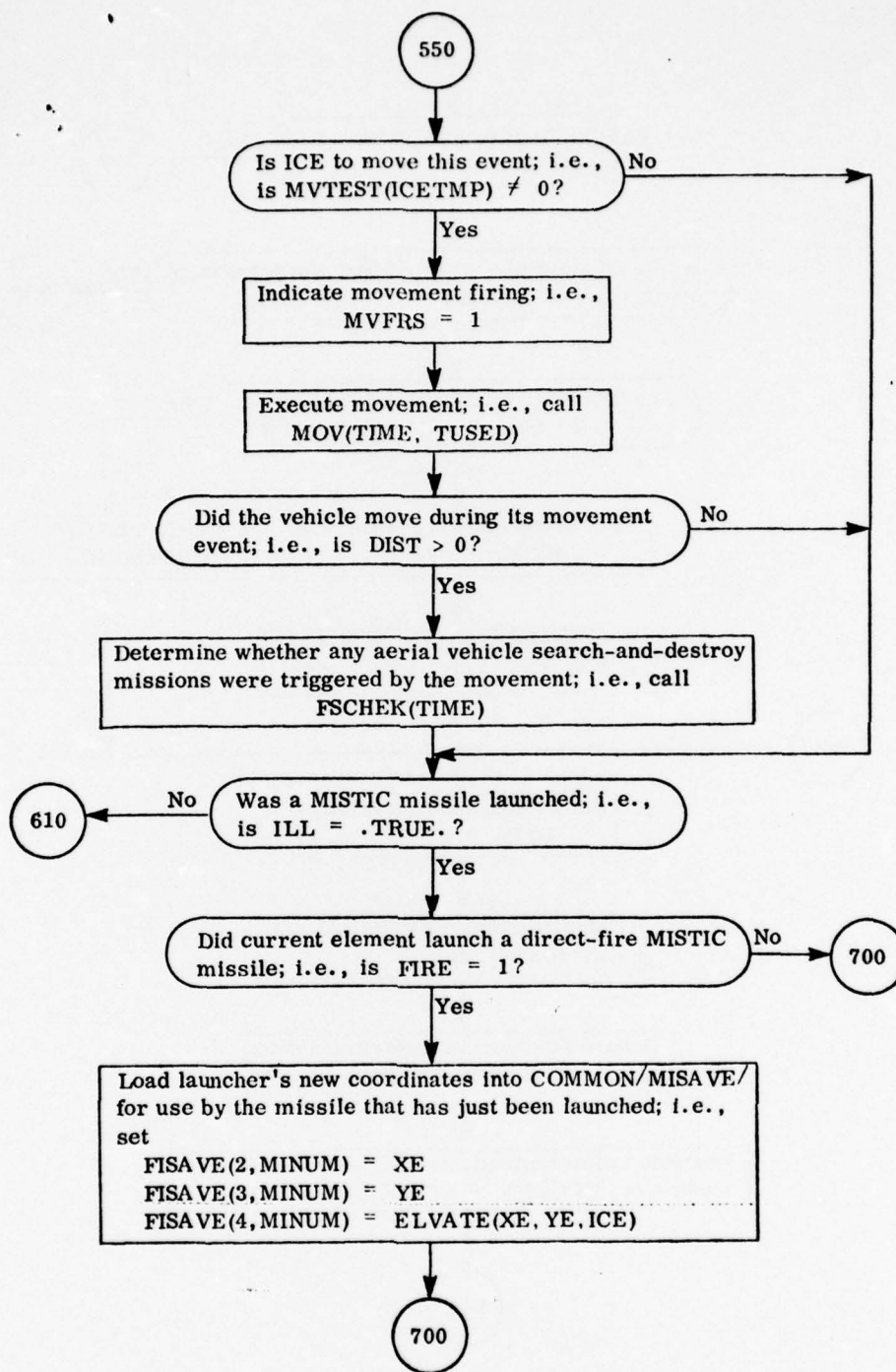
DYNTACS Main Program: Continued



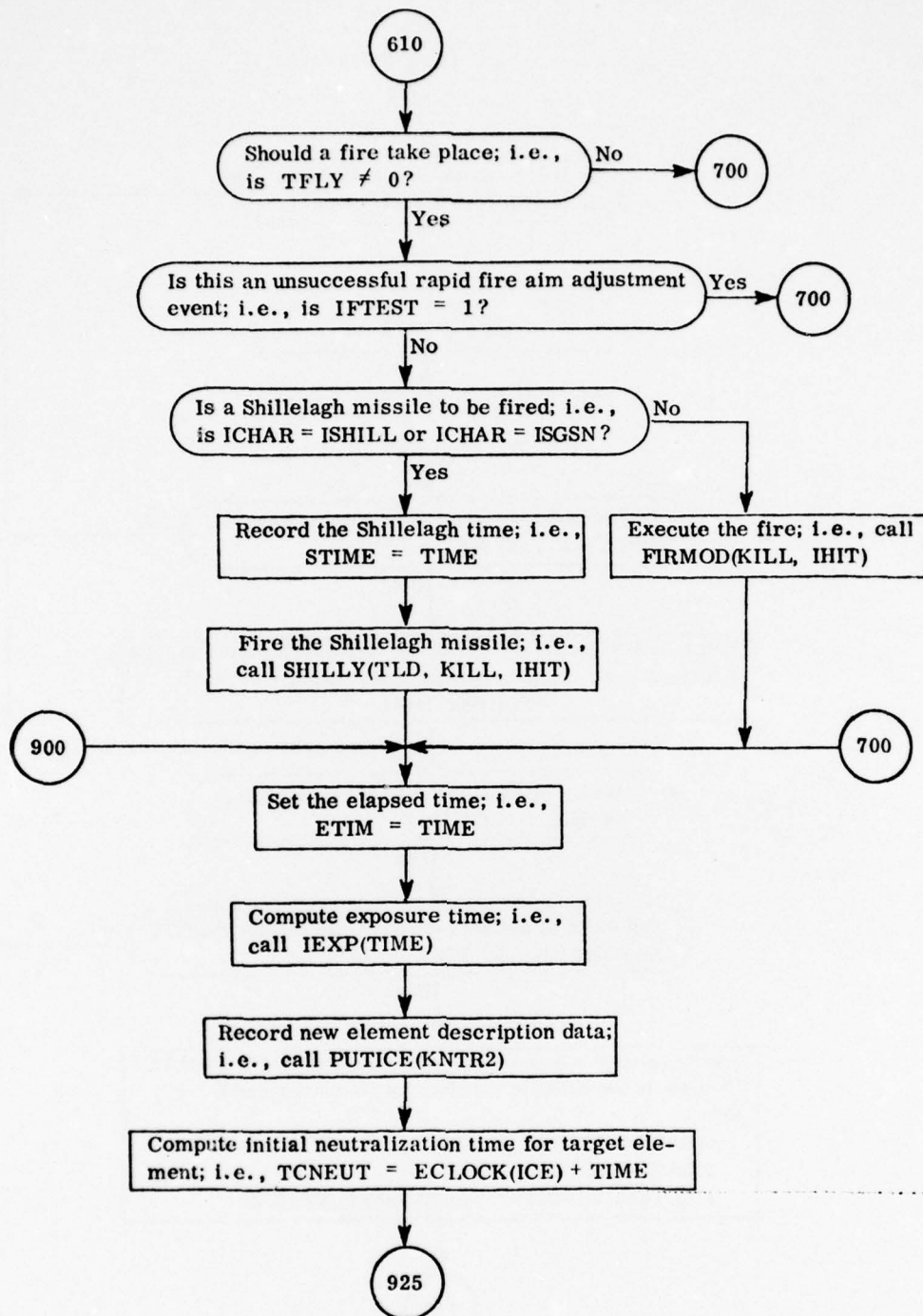
DYNTACS Main Program: Continued



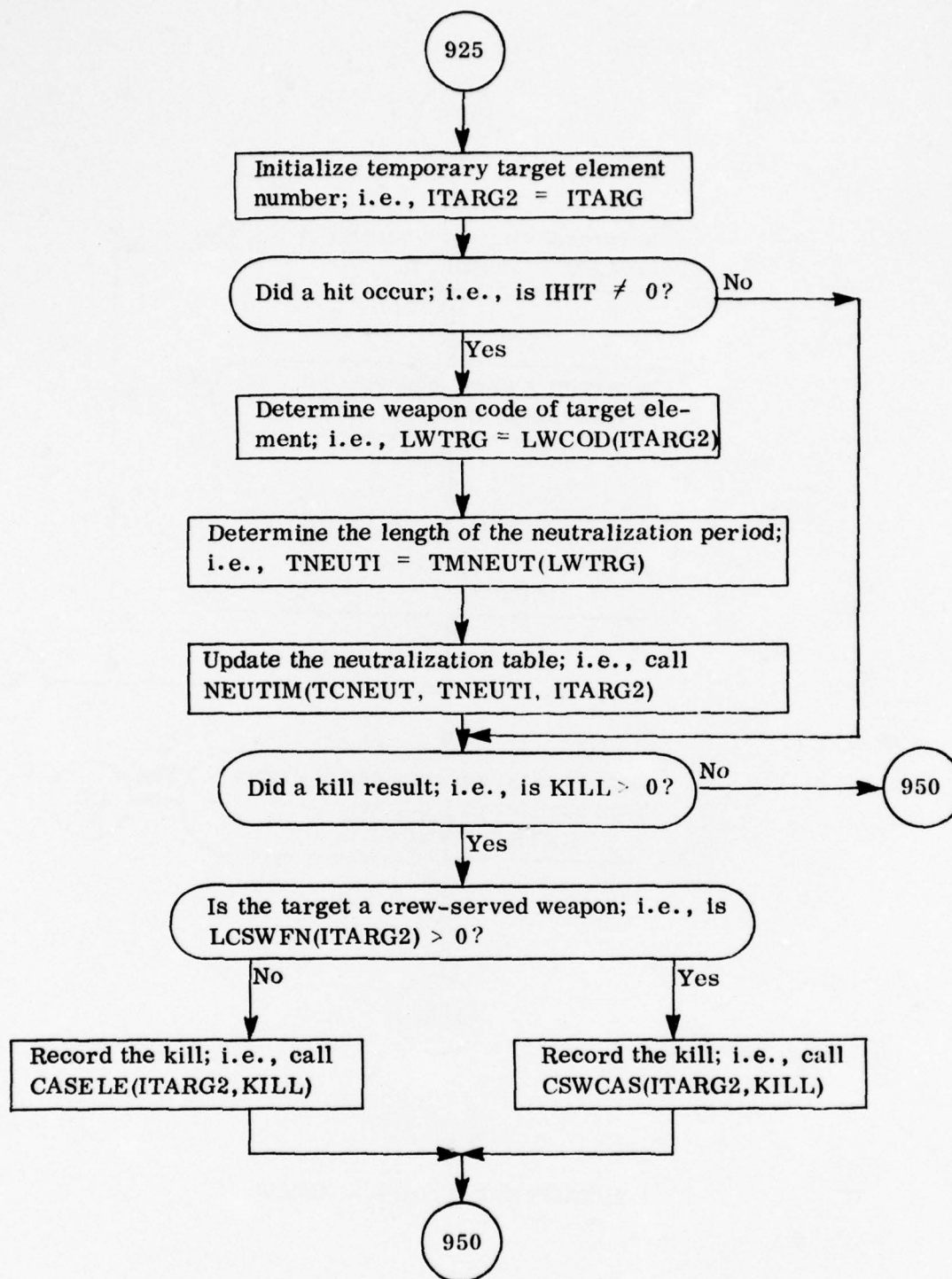
DYNTACS Main Program: Continued



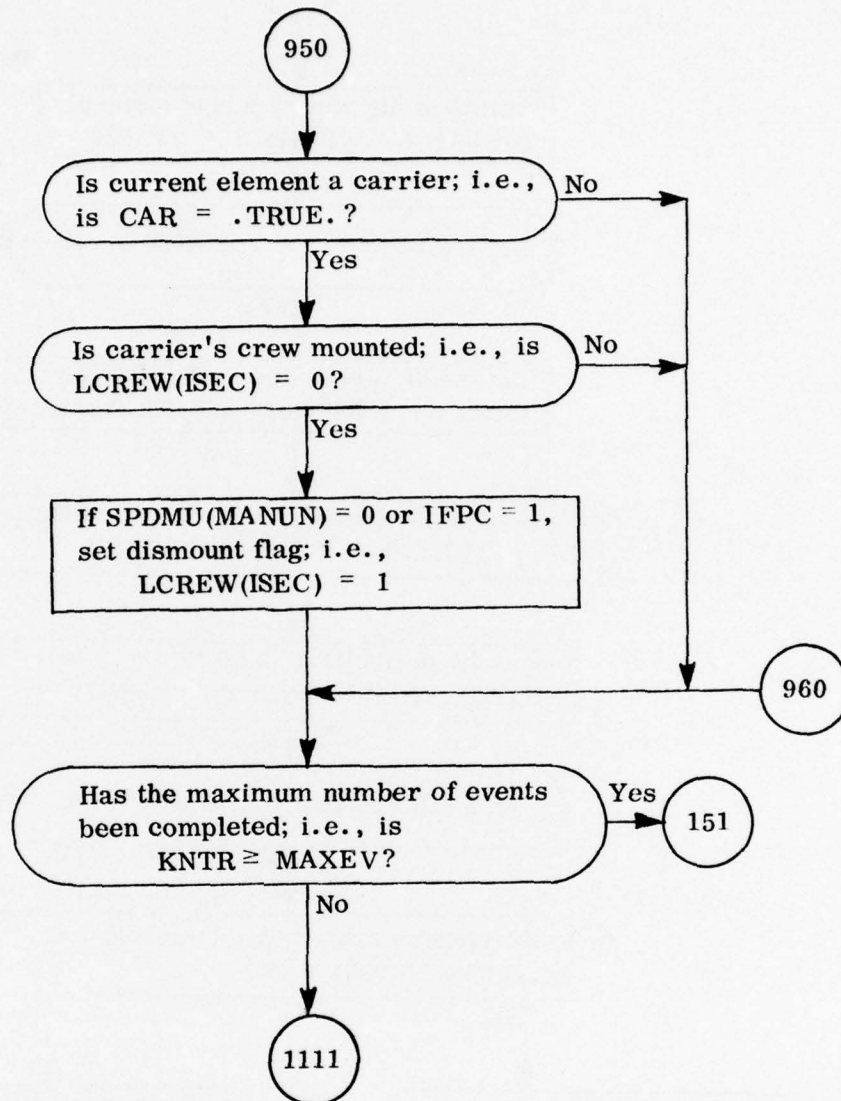
DYNTACS Main Program: Continued



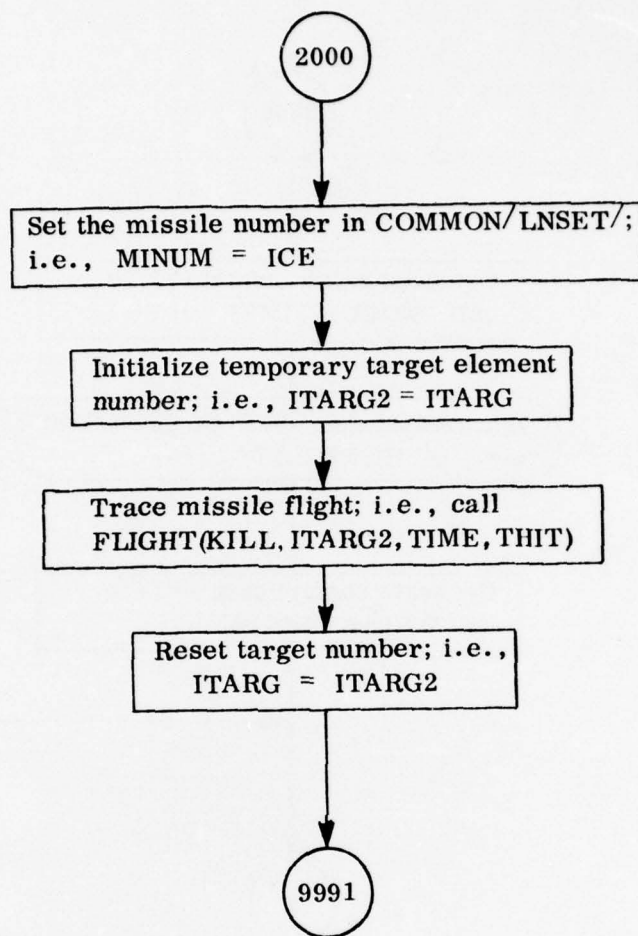
DYNTACS Main Program: Continued



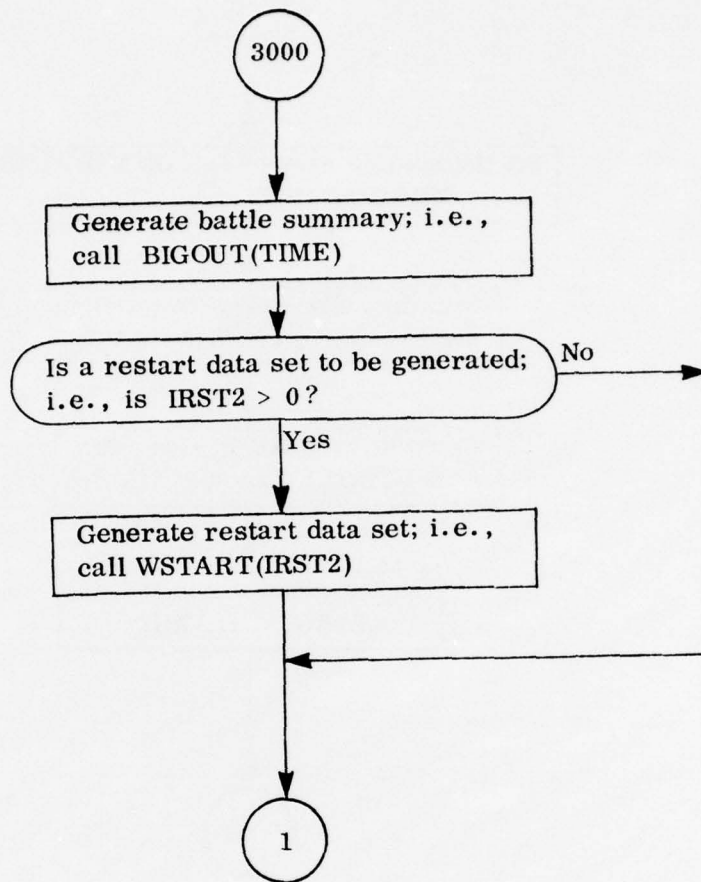
DYN TACS Main Program: Continued



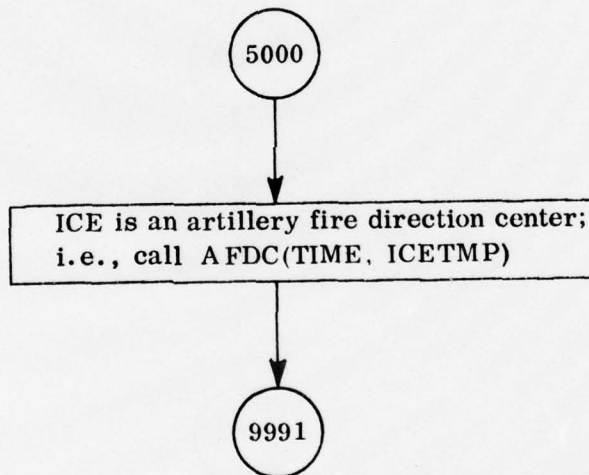
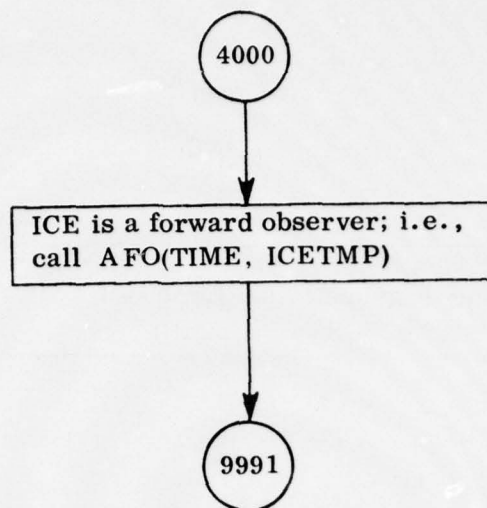
DYN-TACS Main Program: Continued



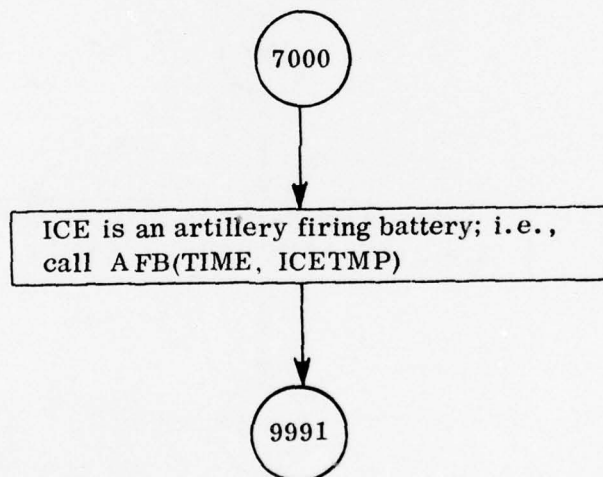
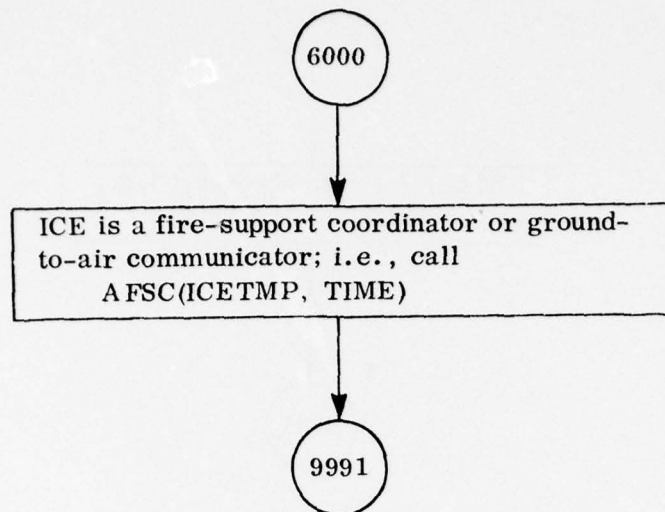
DYNTACS Main Program: Continued



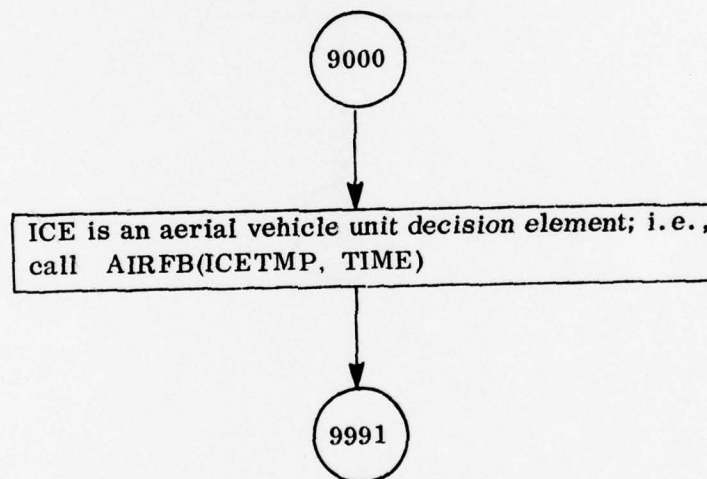
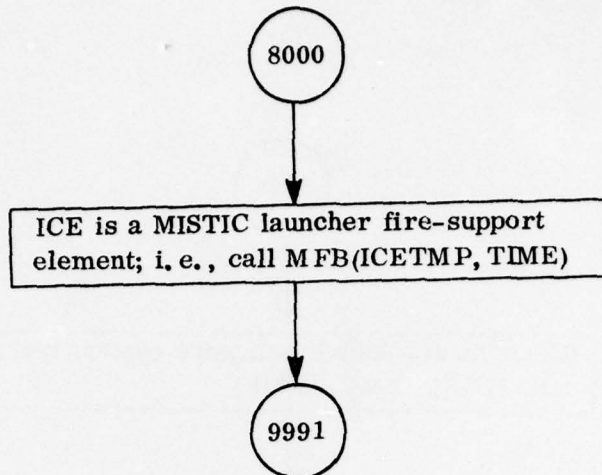
DYNTACS Main Program: Continued



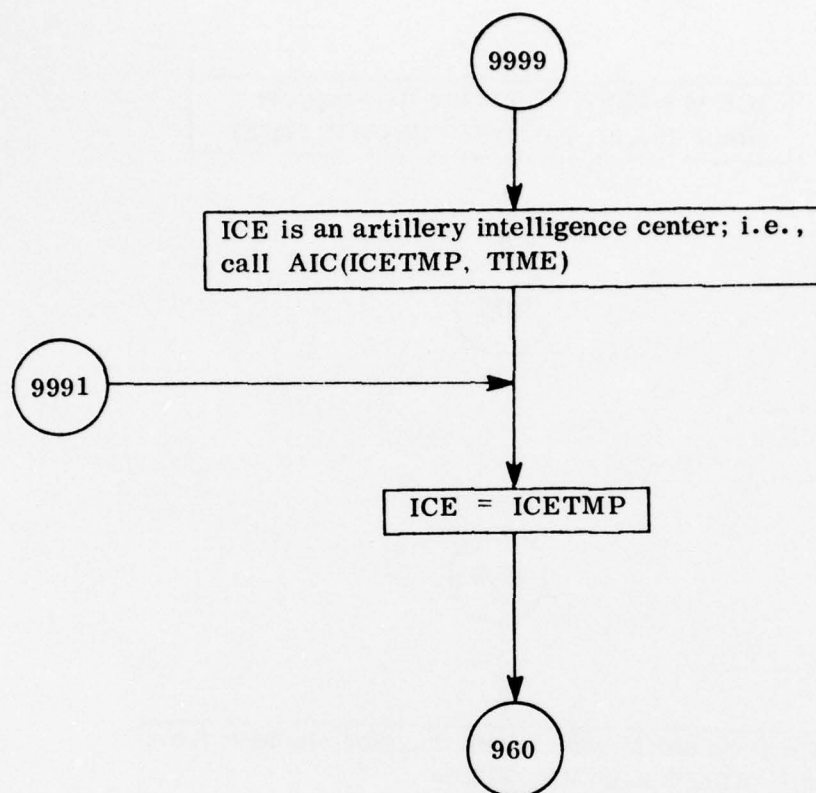
DYNTACS Main Program: Continued



DYNTACS Main Program: Continued



DYNTACS Main Program: Continued



DYNTACS Main Program: Continued

Subroutine MFB

PURPOSE: Subroutine MFB is designed to represent the communication activities of the missile launcher fire-support element. Both aerial and ground launchers are treated.

CALLING SEQUENCE:

CALL MFB(LCHN, TIME)

where

LCHN = launcher number being processed
TIME = computed event time for the launcher

METHOD: See Chapter 3 of Volume 1.

COMMON AREAS REFERENCED:

| | | | | |
|--------|--------|--------|--------|--------|
| CLKFB | ISACT | LPREV | NFR | STRTIM |
| DURRL | JFRND | LSEC | NMISUN | TIFRDY |
| ECLOCK | KFO | LVENT | NRNDFR | USEN |
| ENDMIS | KFOD | LWCOD | NTELE | WAITAD |
| ESPD | KPRIOR | MAINPR | NOBVH | WAITFO |
| EVTIM | KPTFRL | MDFAF | NUMBER | XD |
| IFBMIS | LFPC | MISFRL | NVOLM | XFRL |
| IFDCNT | LHICE | MISTYP | NXFRL | YD |
| IFRFL | LKILL | MREADY | SEQPAR | YFRL |
| IFRND | LMANU | NFB | SIGSEN | |
| IPRIRR | LNSET | NFOFR | STRMIS | |

SUBROUTINES REQUIRED:

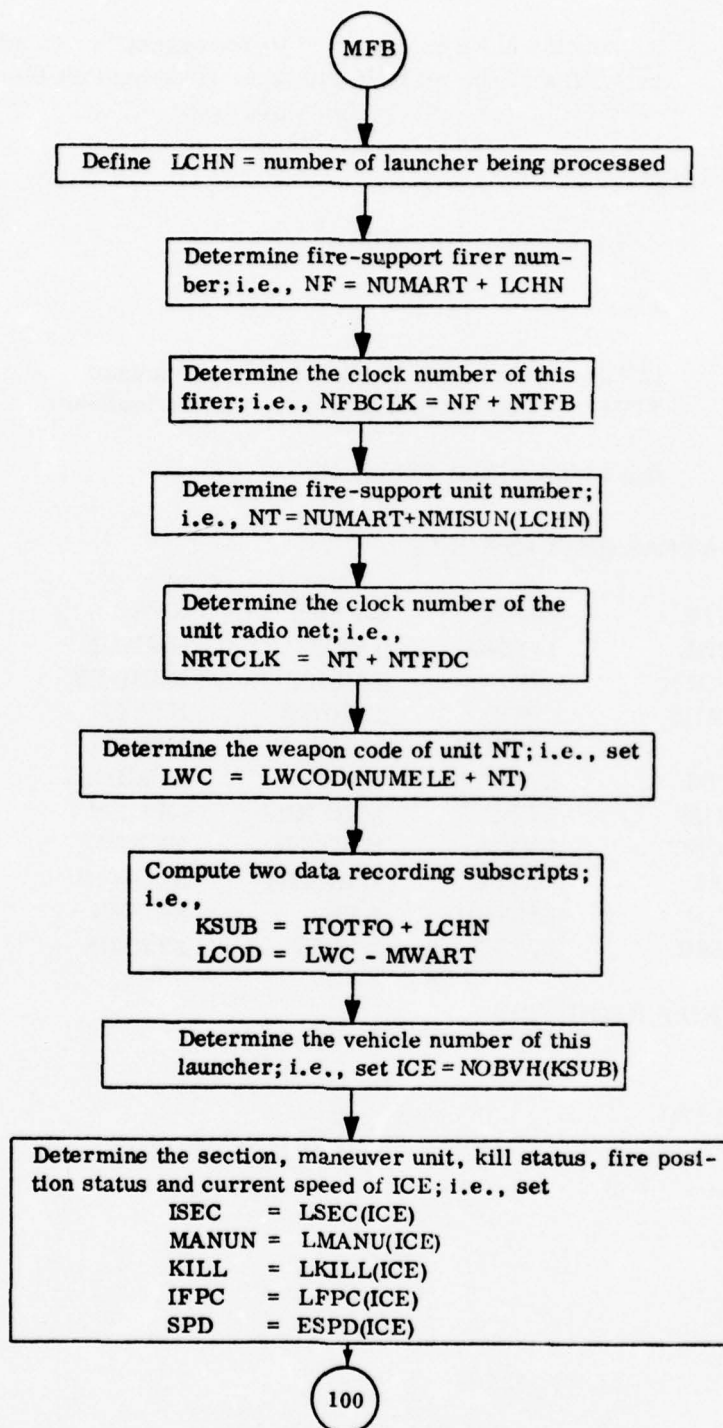
ELOC
WRTFRL

MFB CALLED BY:

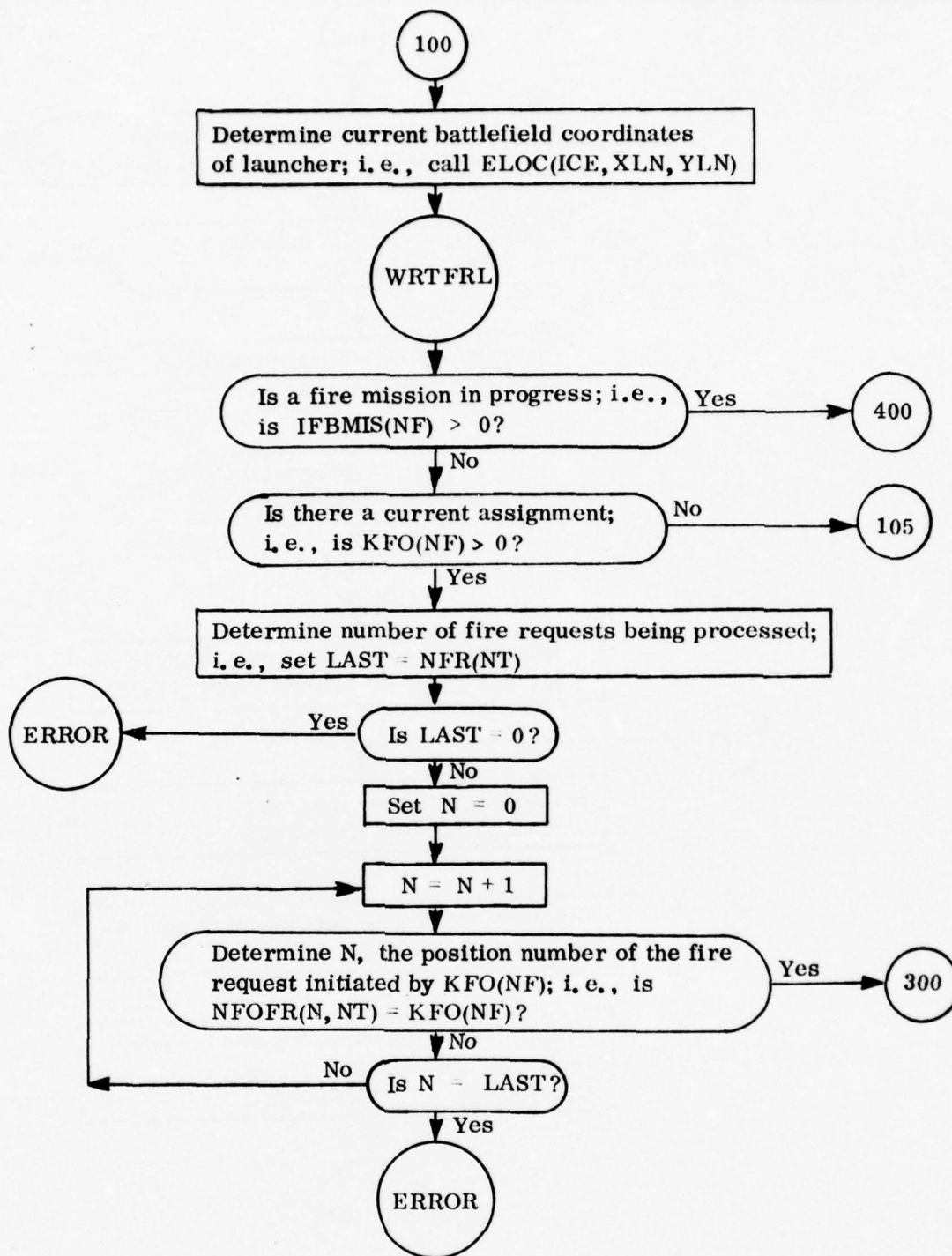
MAIN

STORAGE:

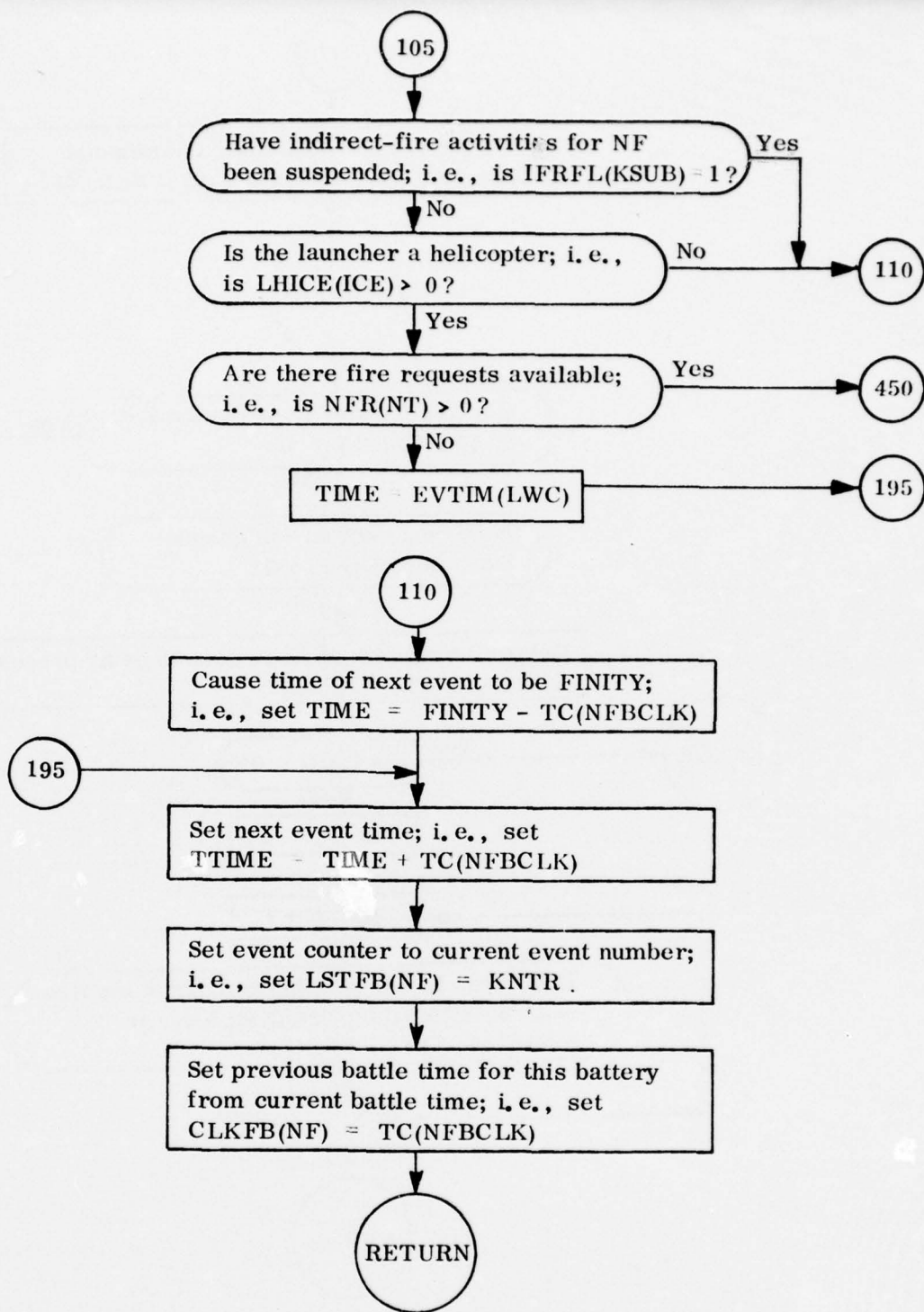
$1A1E_{16} = 6686_{10}$ bytes



Subroutine MFB: MISTIC Indirect-Fire Launch Activities



Subroutine MFB: Continued



Subroutine MFB: Continued

300

Set firing data equal to data for next requested fire; i. e., set

$XD(NF) = XFRL(N, NT)$
 $YD(NF) = YFRL(N, NT)$
 $NVOLM(NF) = NRNDFR(N, NT)$
 $IFRND(LCHN) = 0$
 $JFRND(LCHN) = 0$
 $MREADY(LCHN) = 0$
 $KPRIOR(NF) = IPRIRR(N, NT)$
 $BOOL = .TRUE.$

Set flag to indicate whether LCHN is to communicate for target verification; i. e., set $IFBMIS(NF) = MISFRL(N, NT)$

Determine number of fire requests currently being processed by this fire request net; i. e., set $NL = NFR(NT)$

Yes Is current fire request last on the list; i. e., is $N = NL$?

No

Condense fire request list by overlaying current entry N with last entry NL;

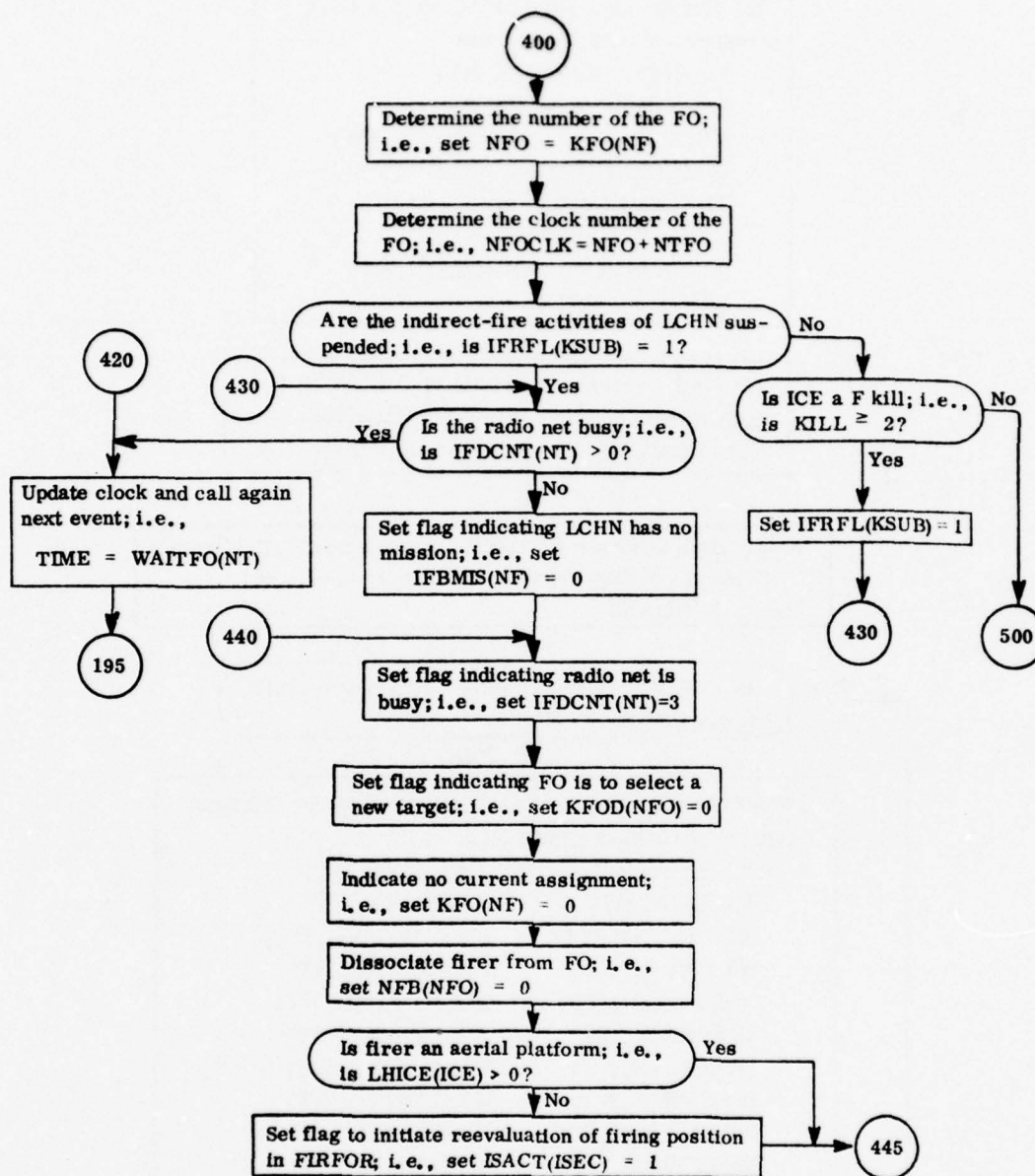
$XFRL(N, NT) = XFRL(NL, NT)$
 $YFRL(N, NT) = YFRL(NL, NT)$
 $KPTFRL(N, NT) = KPTFRL(NL, NT)$
 $NXFRL(N, NT) = NXFRL(NL, NT)$
 $MISFRL(N, NT) = MISFRL(NL, NT)$
 $IPRIRR(N, NT) = IPRIRR(NL, NT)$
 $DURRL(N, NT) = DURRL(NL, NT)$
 $NFOFR(N, NT) = NFOFR(NL, NT)$
 $NRNDFR(N, NT) = NRNDFR(NL, NT)$
 $MISTYP(N, NT) = MISTYP(NL, NT)$
 $STRTIM(N, NT) = STRTIM(NL, NT)$

$NFR(NT) = NL - 1$

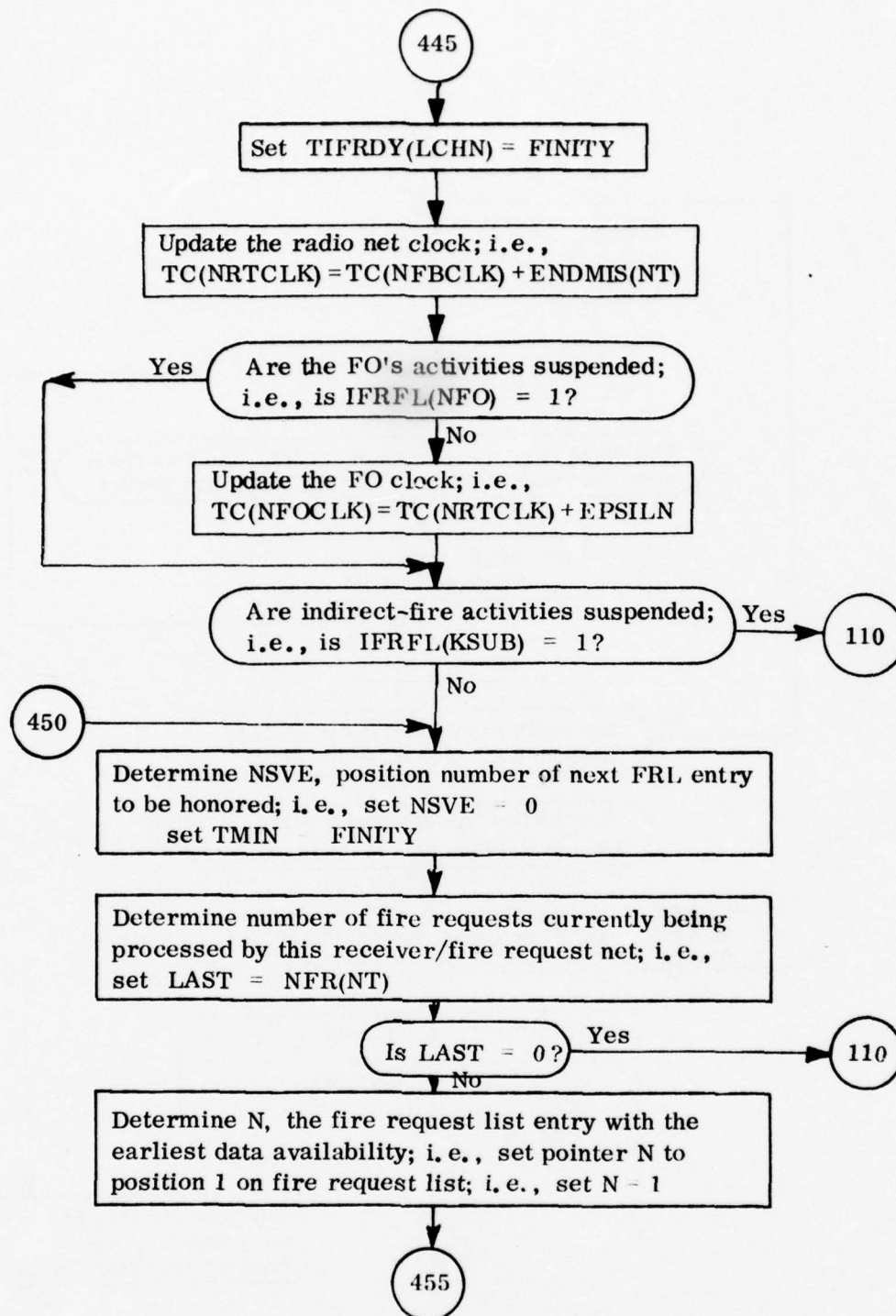
400

Subroutine MFB: Continued

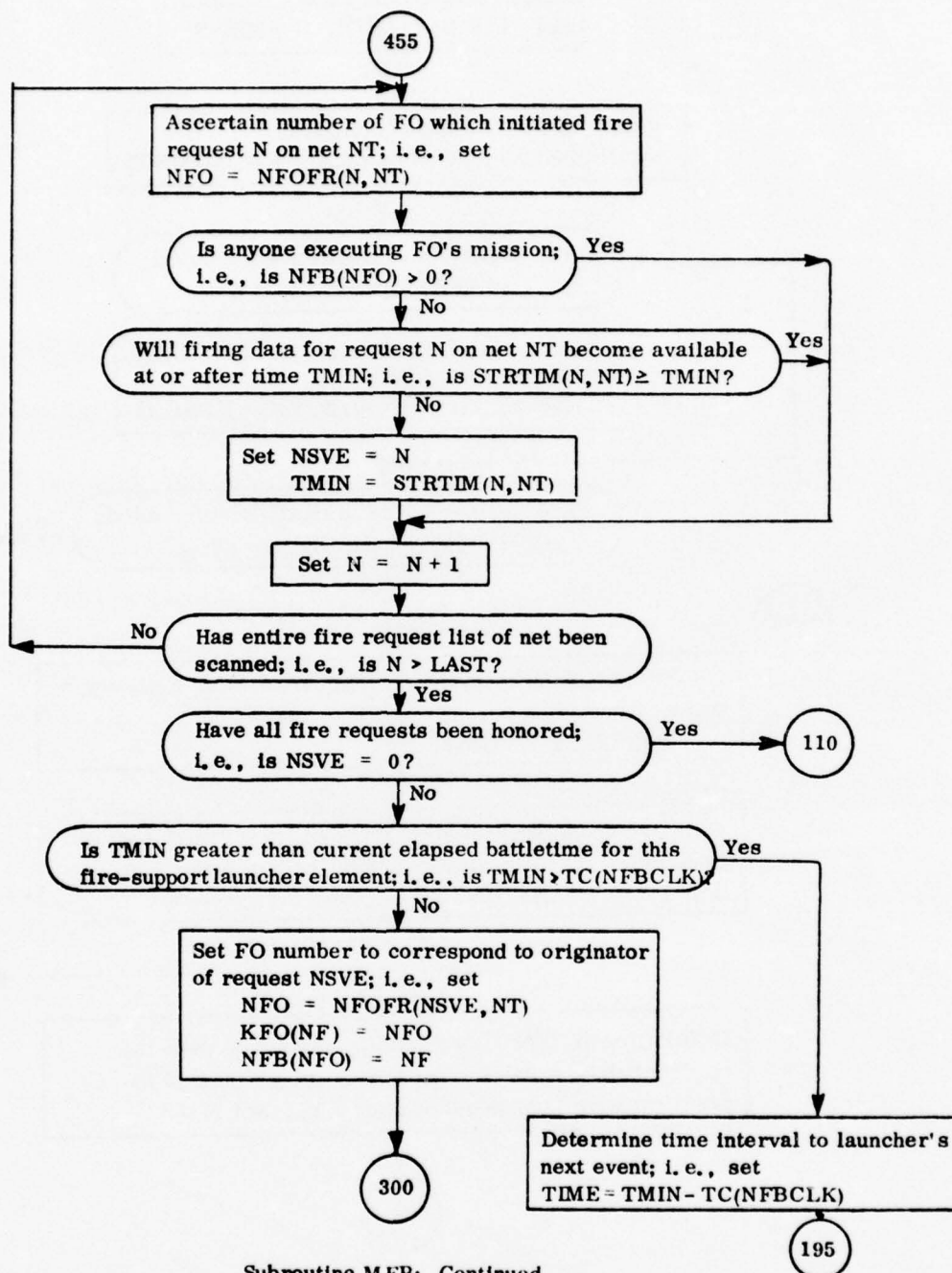
B-555



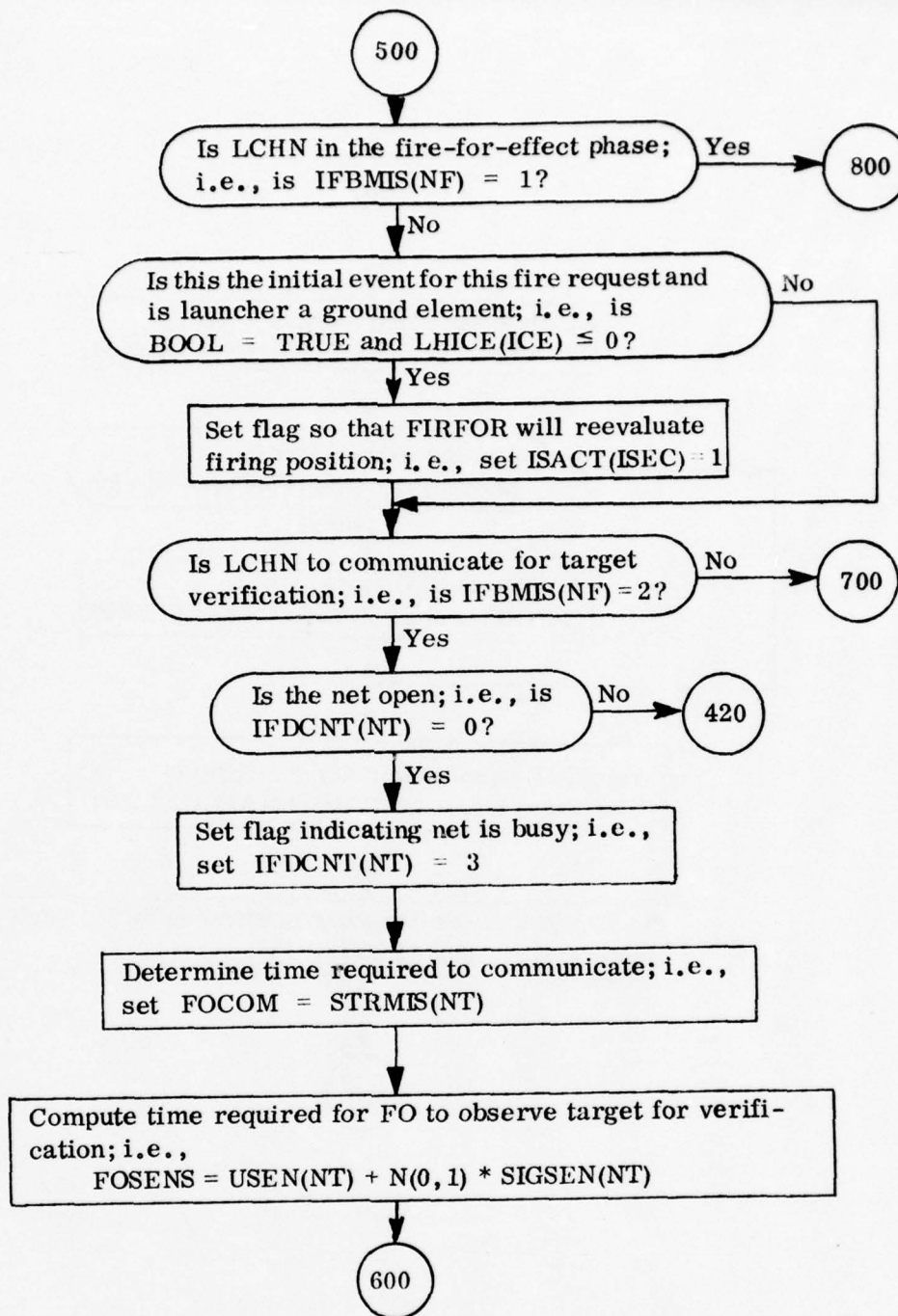
Subroutine MFB: Continued



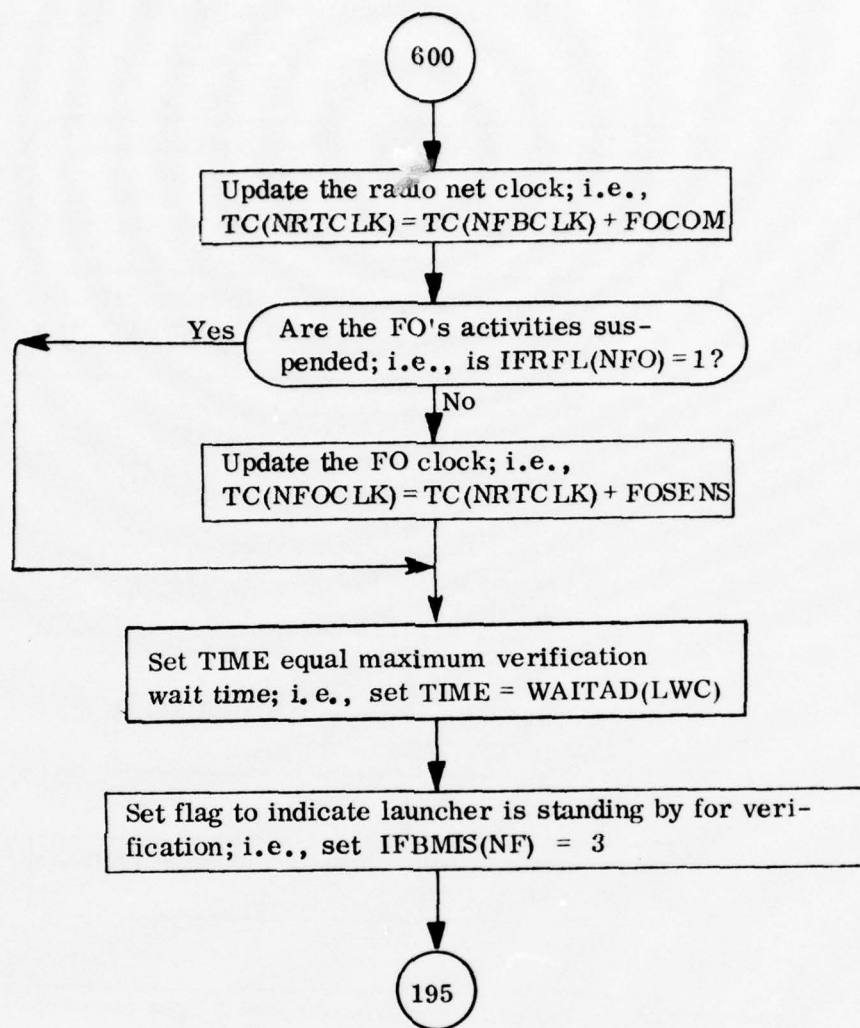
Subroutine MFB: Continued



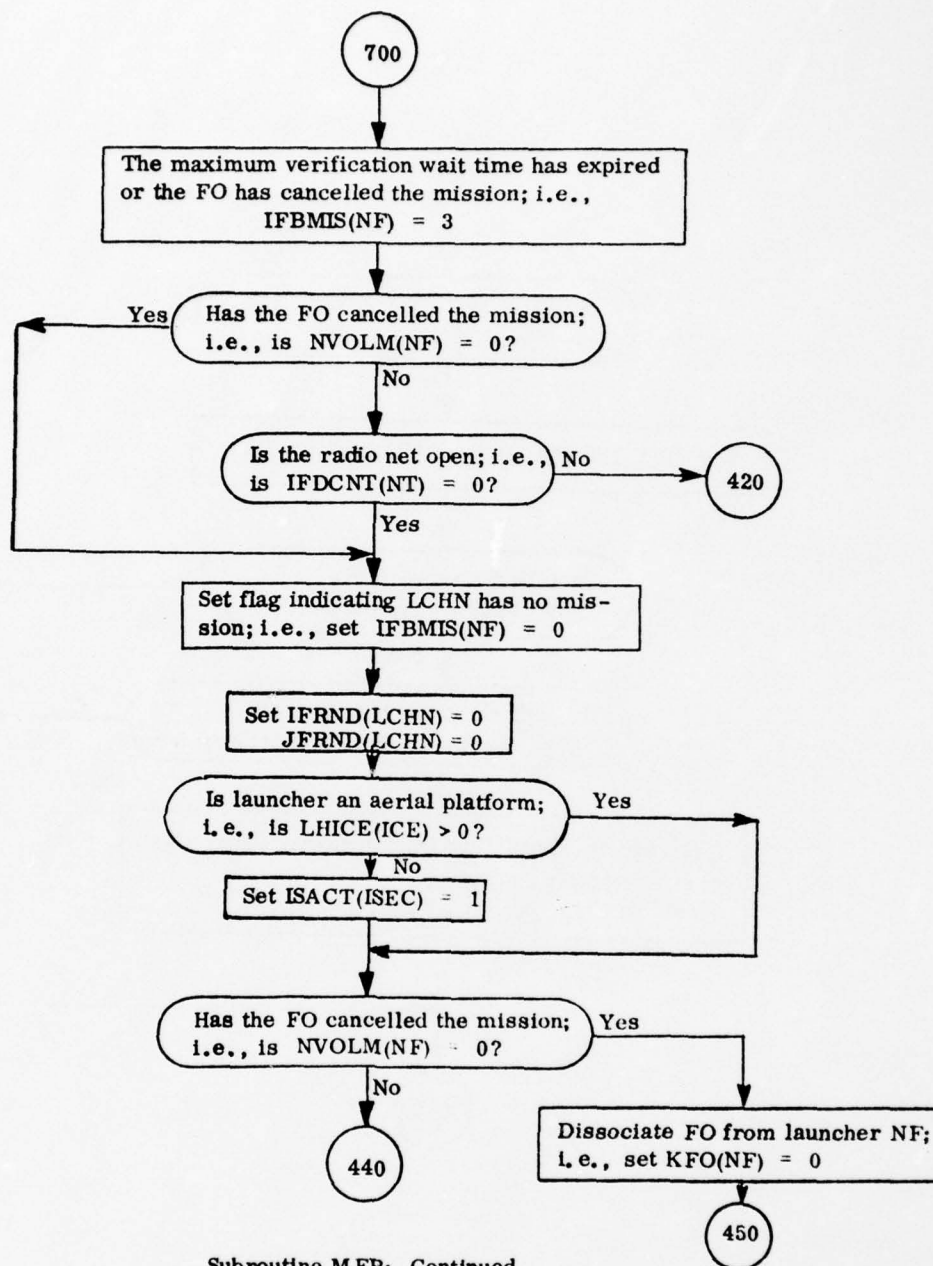
Subroutine MFB: Continued



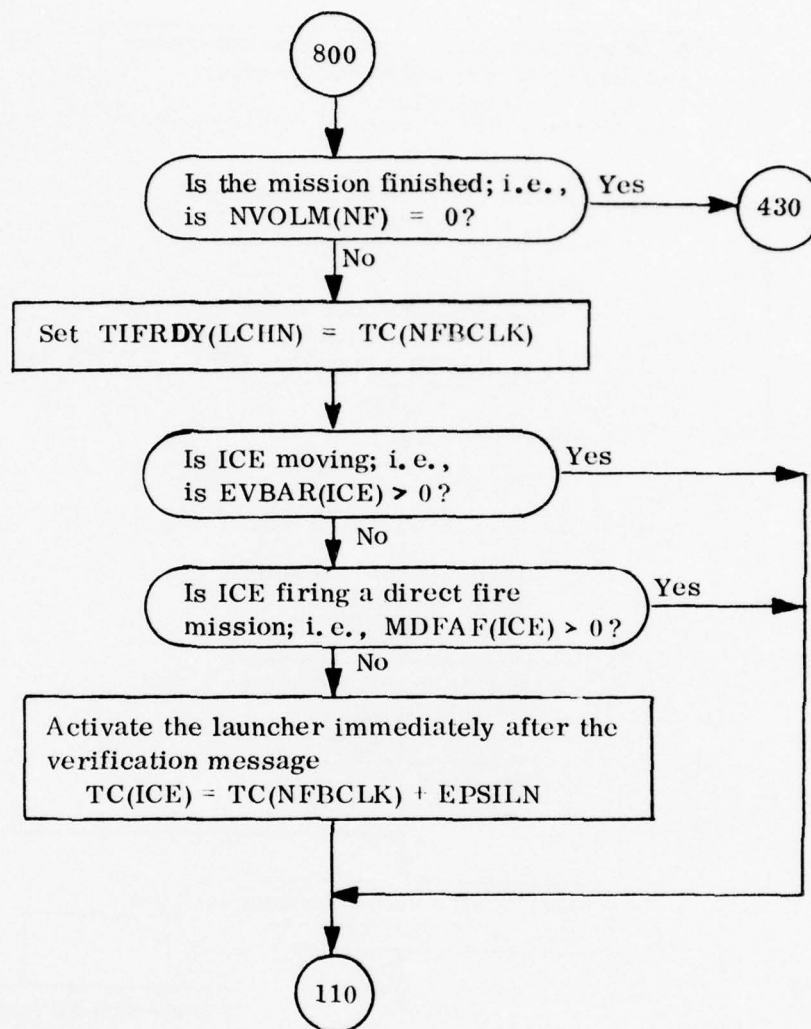
Subroutine MFB: Continued



Subroutine MFB: Continued



Subroutine MFB: Continued



Subroutine MFB: Continued

Subroutine MISEND

PURPOSE: Subroutine MISEND determines whether an aerial maneuver unit should terminate its present mission and stand by for reassignment.

CALLING SEQUENCE:

CALL MISEND(NAT, ITERM)

where

NAT = number of aerial maneuver unit being processed

ITERM = { flag that indicates whether or not
present mission should be terminated
1 if mission should be terminated
0 if otherwise

METHOD: See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| DURFB | KMANU | NTELE |
| IPORG | MANORG | NUMBER |
| ITORG | MANTYP | NVOLM |
| IUNACT | MCLASS | TMISUN |
| JUNACT | NAVSEC | |

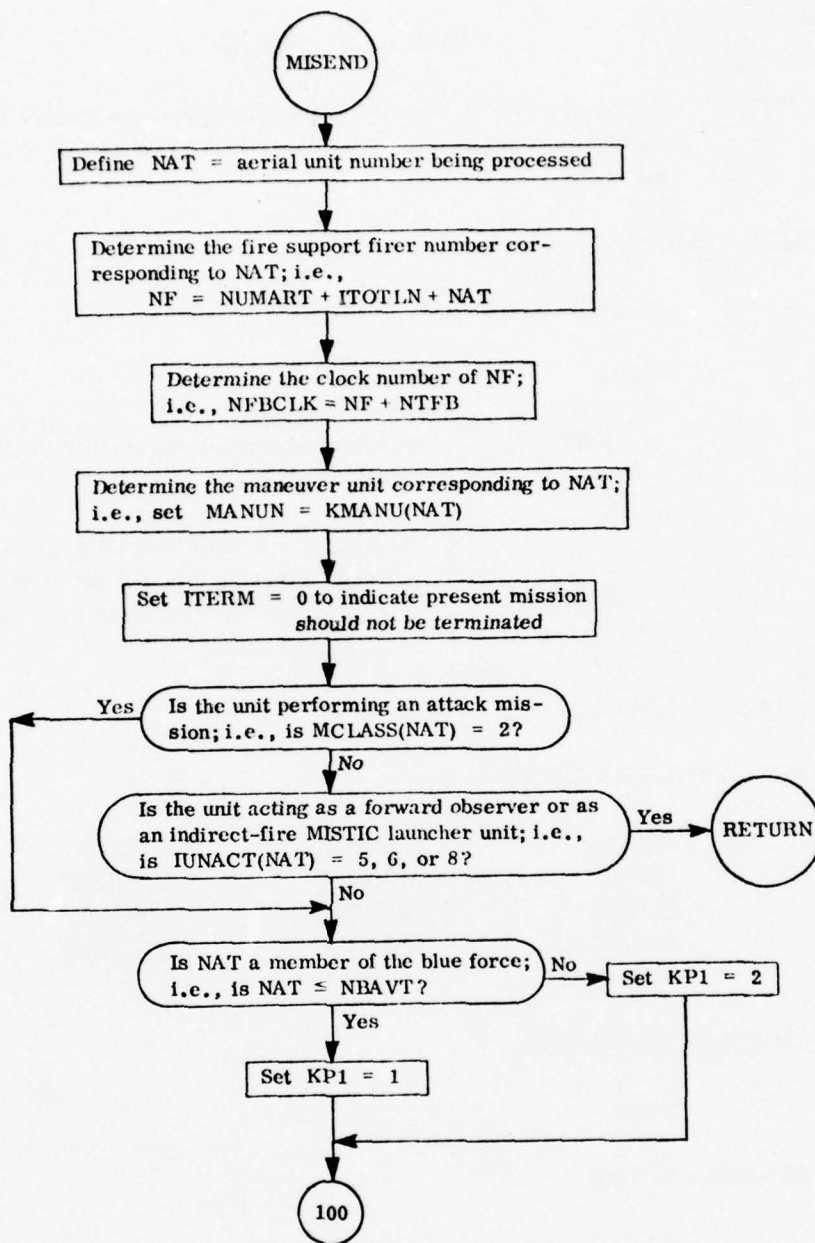
SUBROUTINES REQUIRED:

None

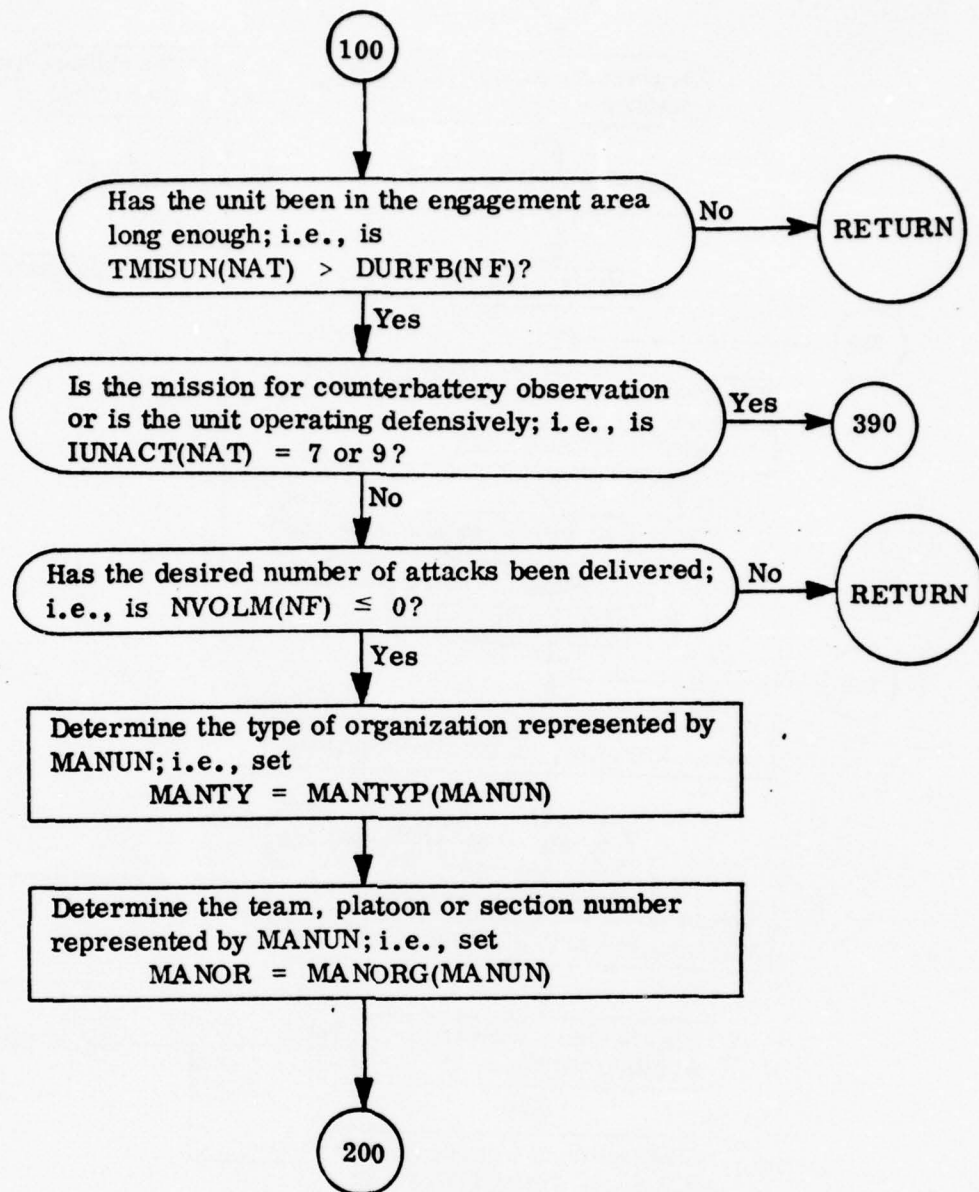
MISEND CALLED BY:

ATDEC

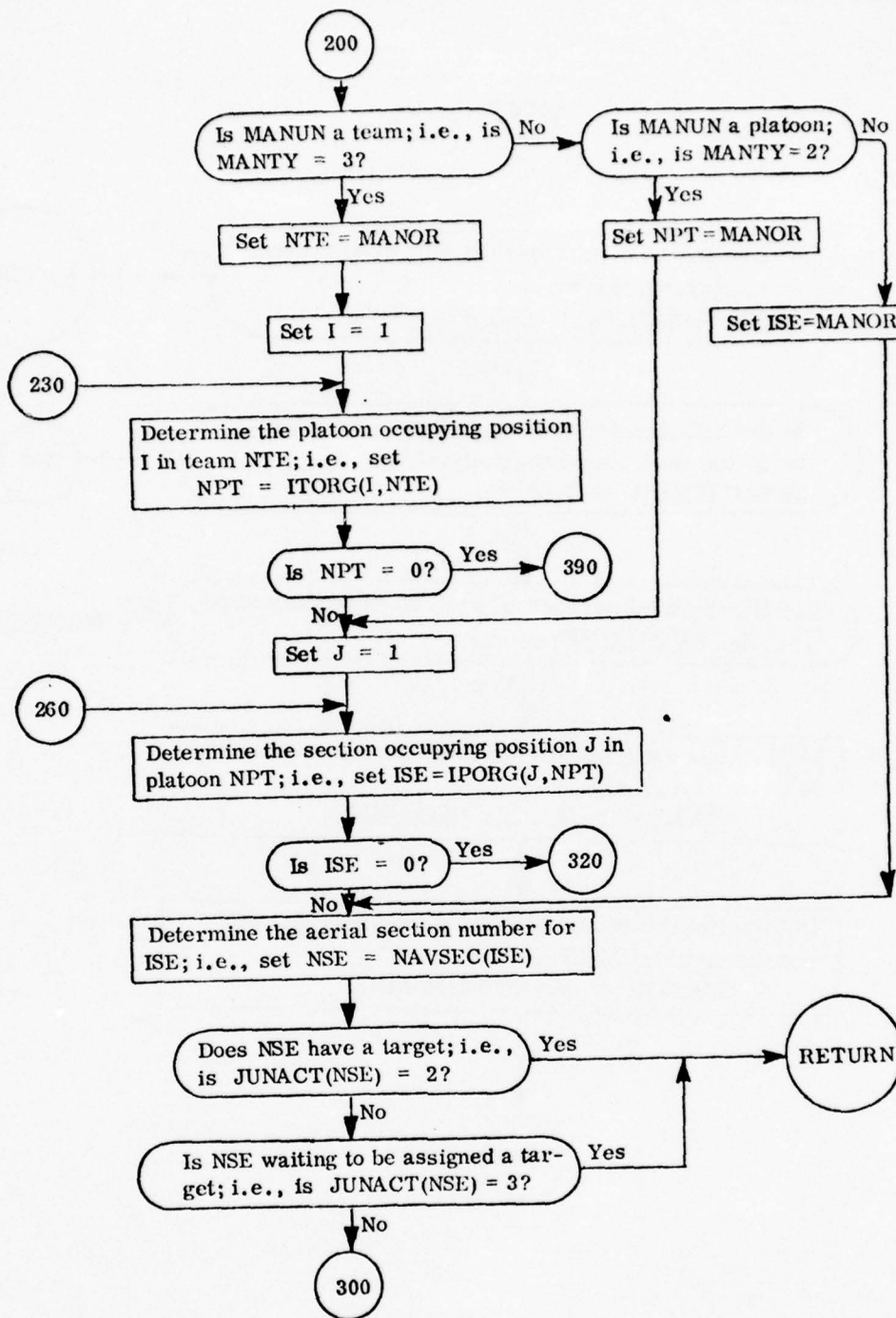
LENGTH: $5E6_{16} = 1526_{10}$ bytes



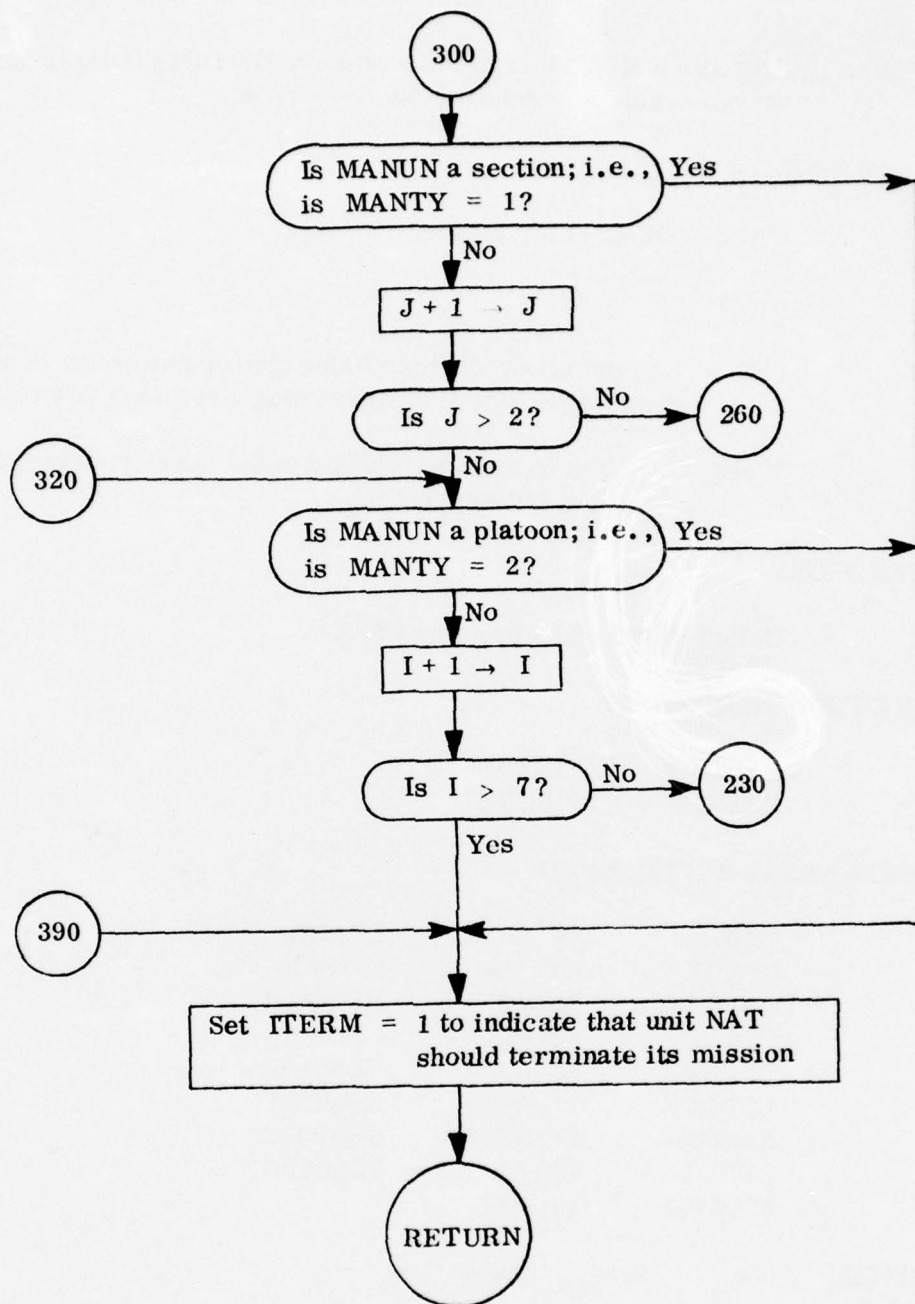
Subroutine MISEND: Helicopter Mission Termination Procedures



Subroutine MISEND: Continued



Subroutine MISEND: Continued



Subroutine MISFEND: Continued

Subroutine MOUNT

PURPOSE: Subroutine MOUNT is used to return CSW crews to their carrier when a decision to remount has been made.

CALLING SEQUENCE:

CALL MOUNT (IGO, TIME)

where

IGO = flag indicating whether firing and/or movement is allowed by the APC following remounting event (see CSWCON)

TIME = time increment to be added to the carrier's clock to account for remounting.

RESTRICTIONS:

Called only from subroutine CSWCON.

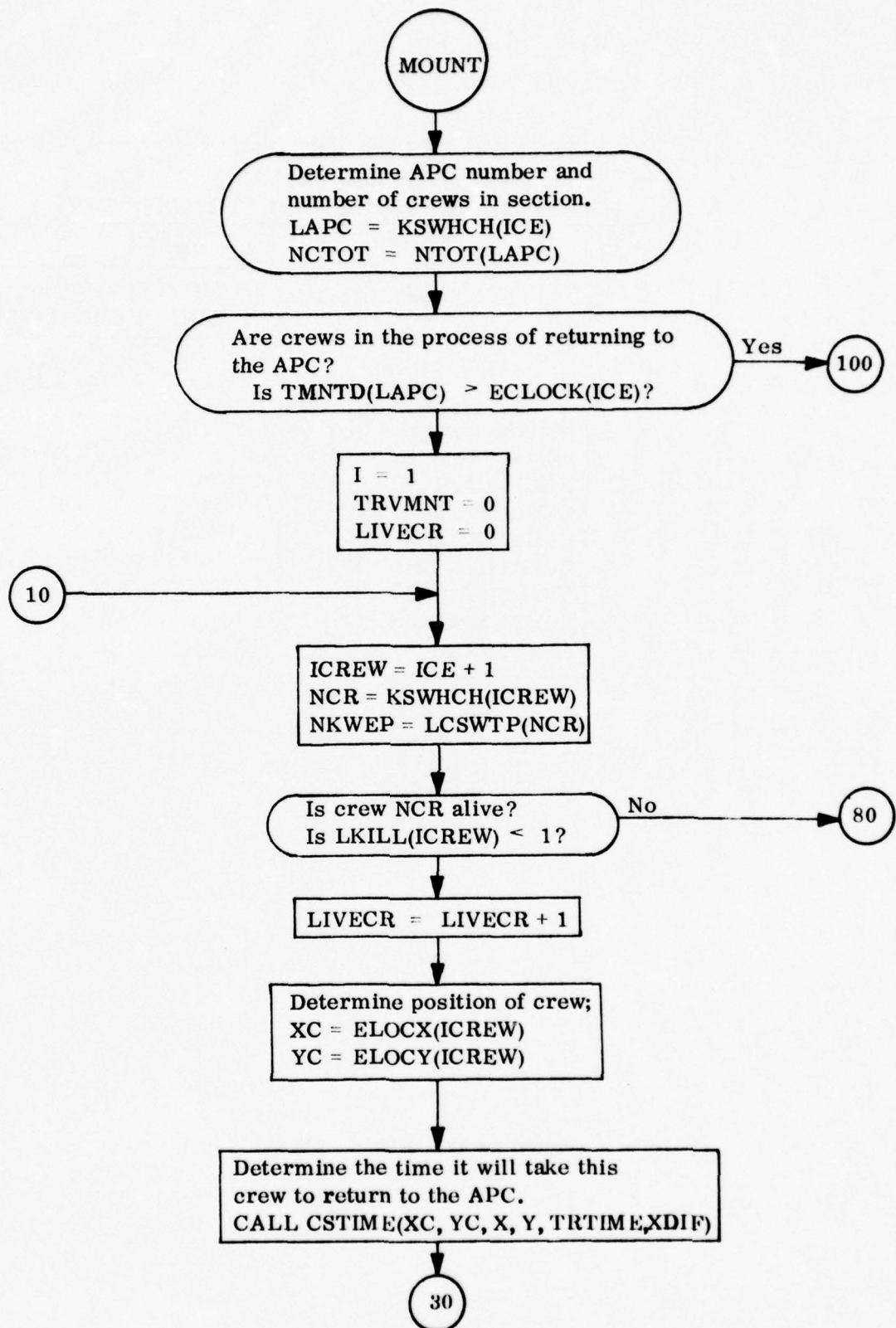
SUBROUTINES REQUIRED:

| | |
|--------|--------|
| CSMOVE | ELOCP |
| CSTIME | FIRCNT |

COMMON AREAS REFERENCED:

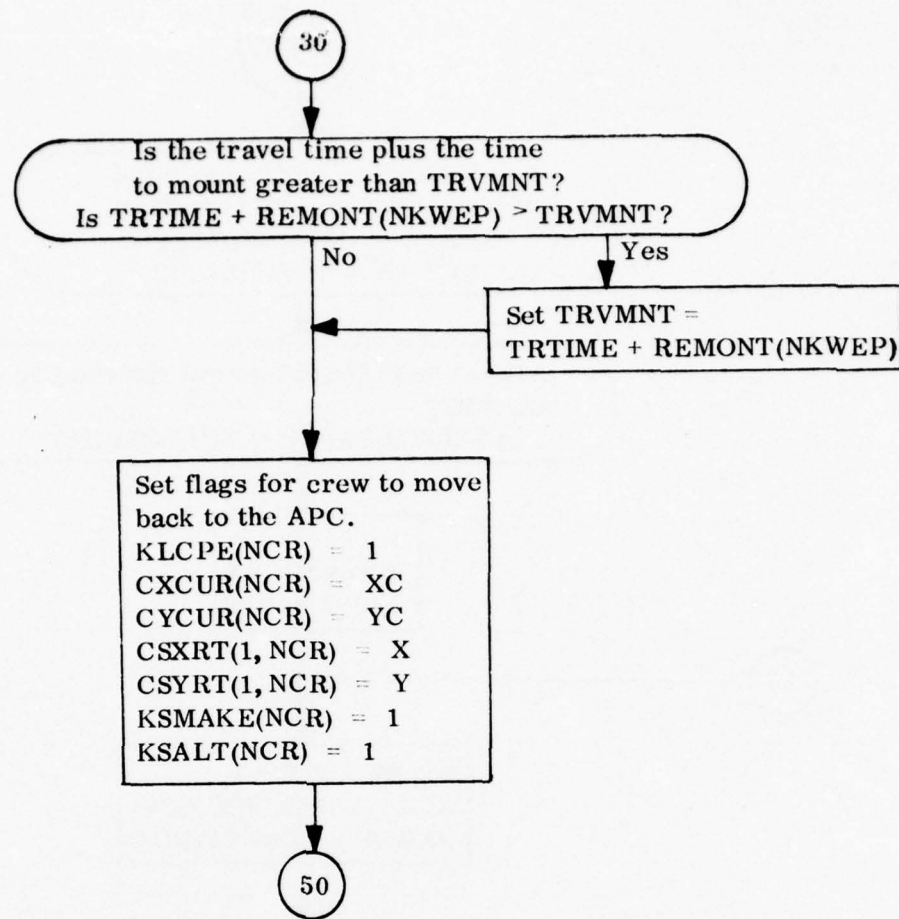
| | | |
|--------|--------|--------|
| CSWDF1 | ISACT | LTARG |
| CSXRT | KLCPE | MDFAF |
| CSYRT | KSALT | MOVPAR |
| CXCUR | KSMKE | NTOT |
| CYCUR | KSWHCH | NUMBER |
| ECLOCK | LCSWFN | REMONT |
| ELOCKX | LCSWTP | SEQPAR |
| ELOCY | LKILL | TMNTD |
| ICECOM | LRNDC | |

STORAGE: $858_{16} = 2136_{10}$ bytes

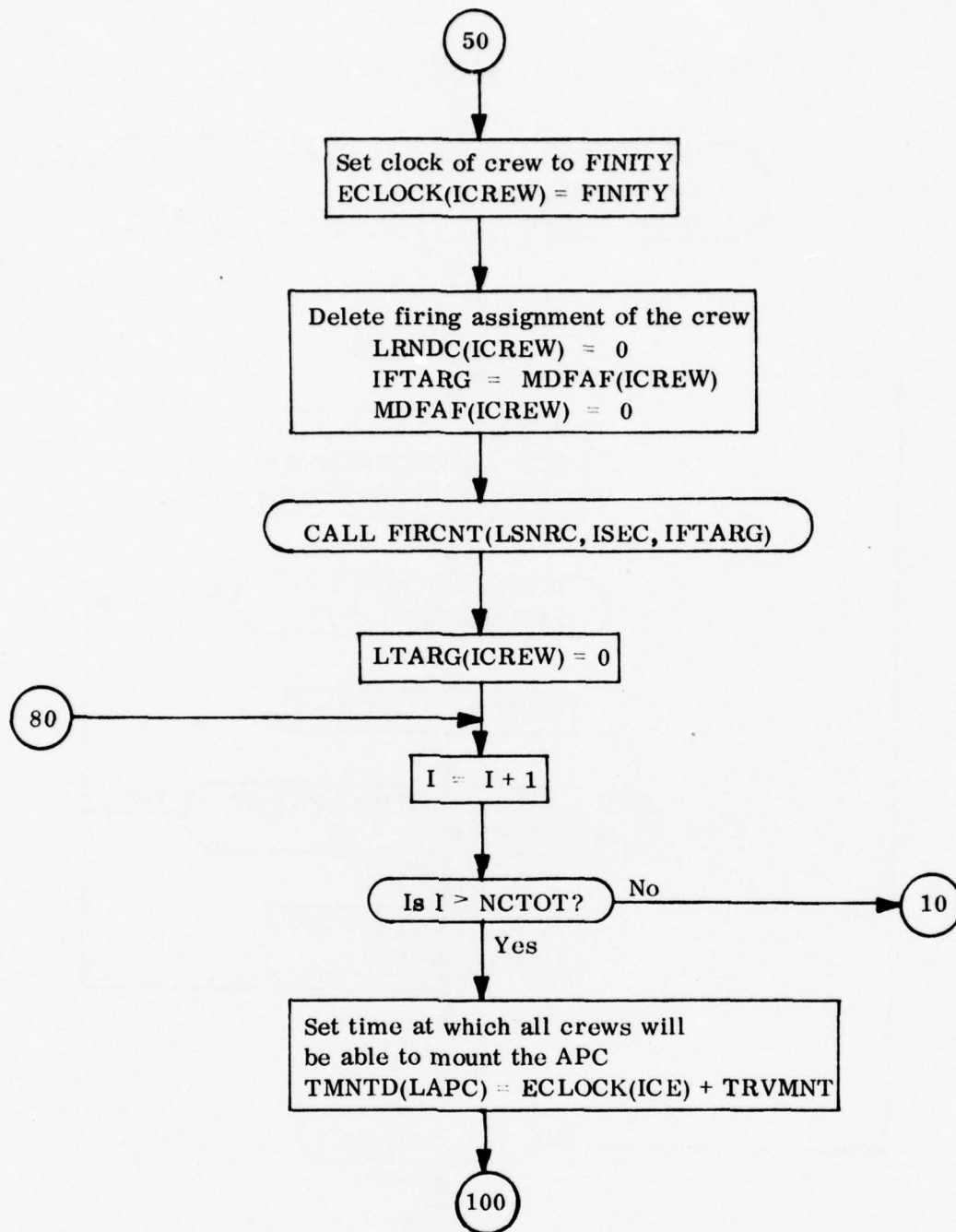


Subroutine MOUNT

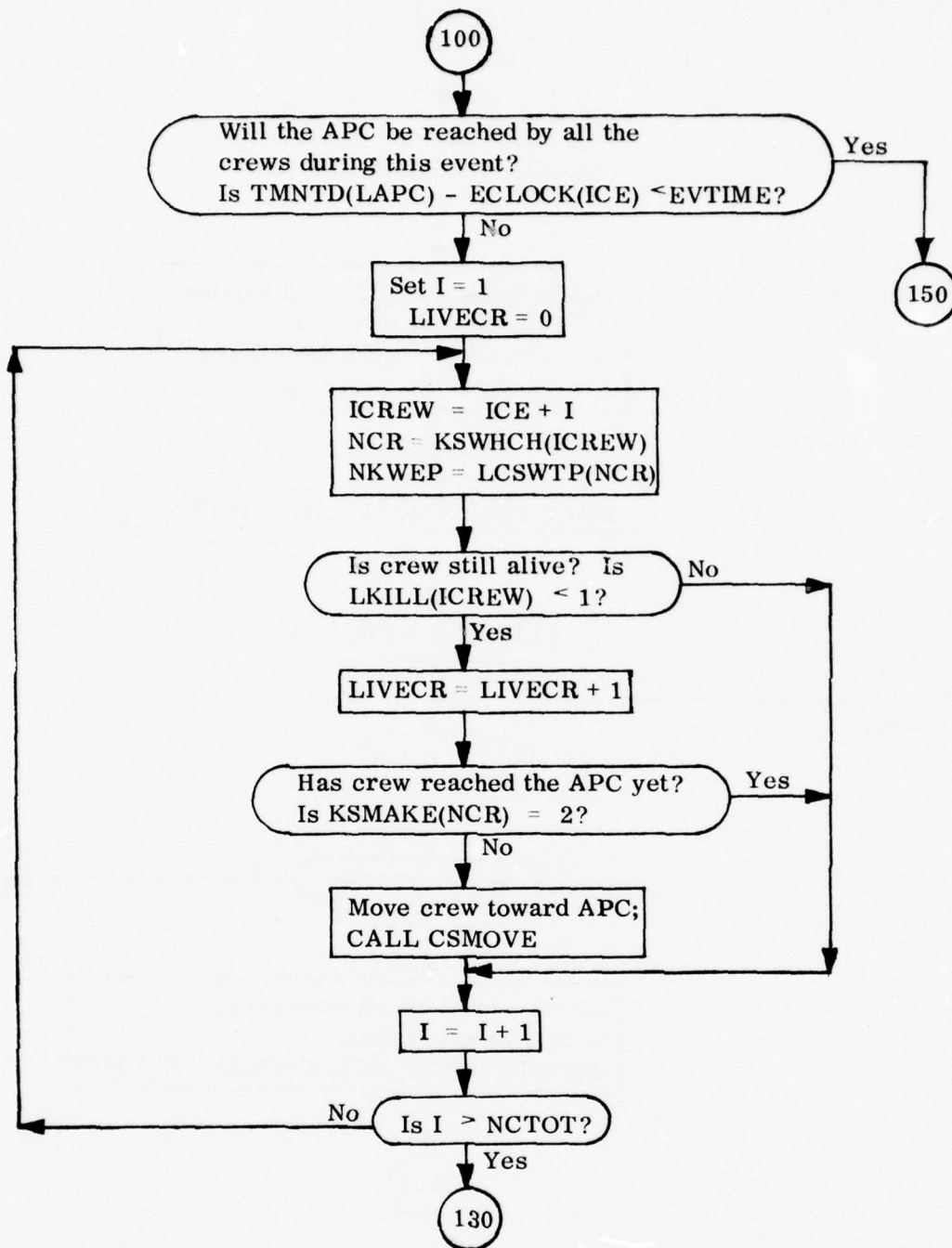
B-569



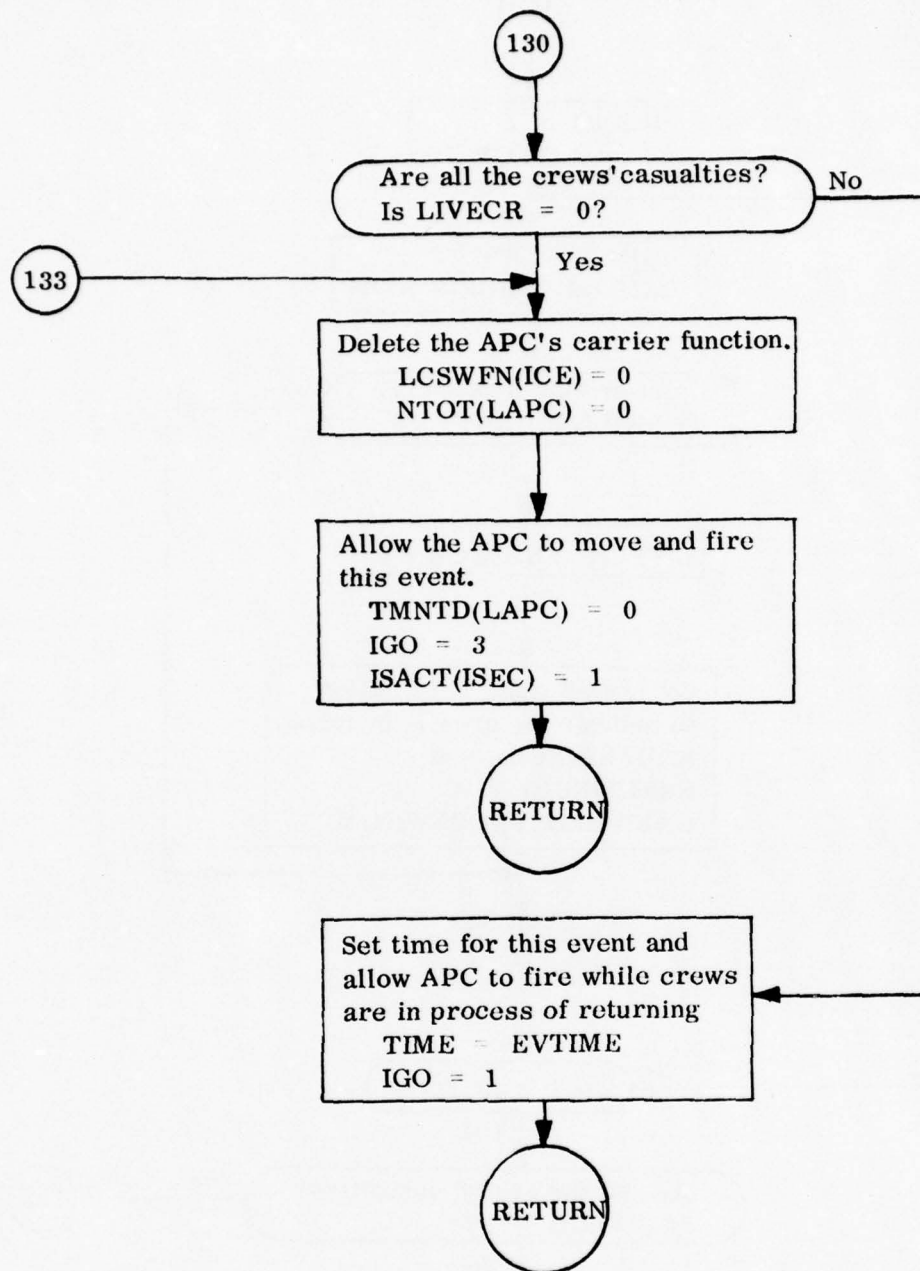
Subroutine MOUNT: Continued



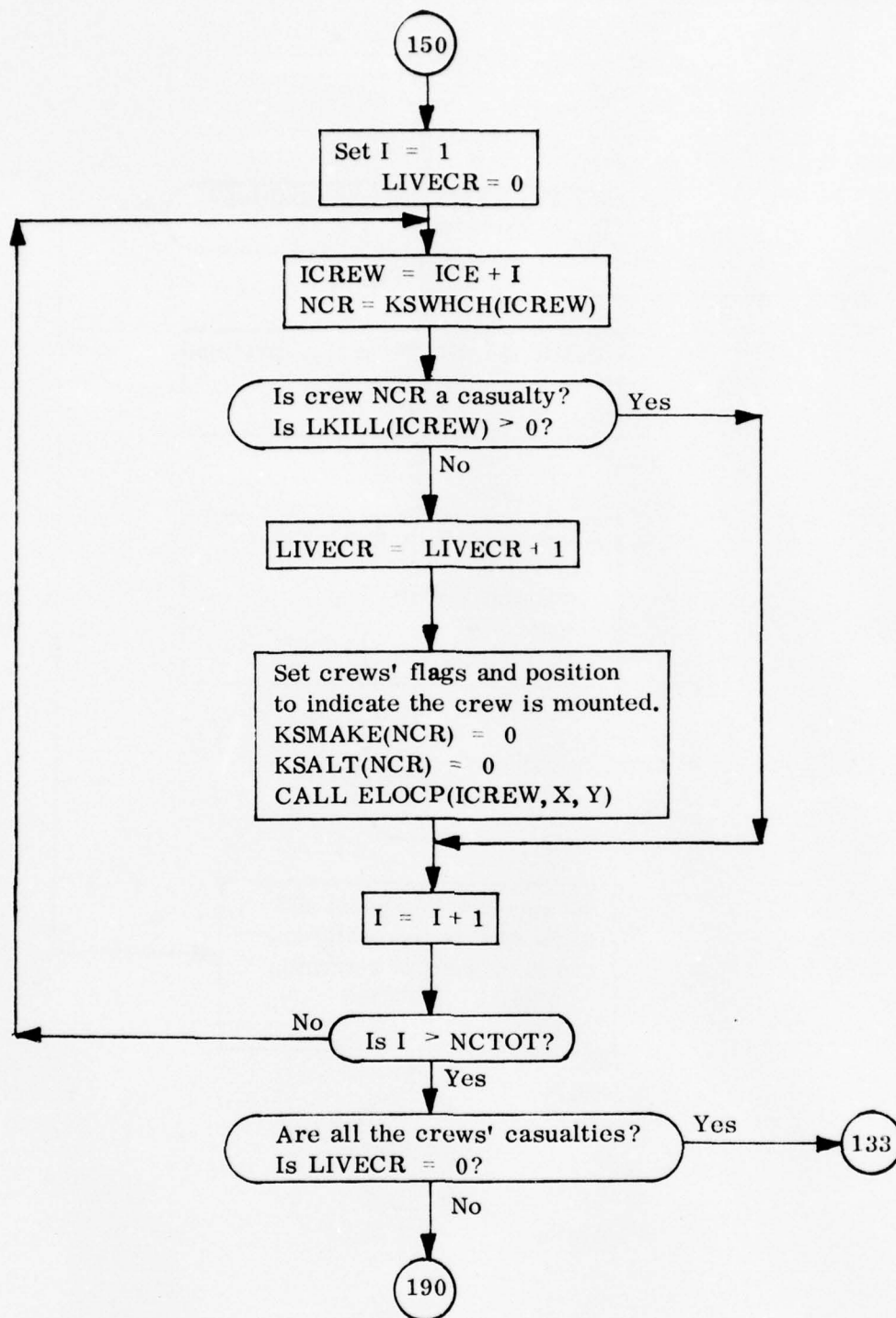
Subroutine MOUNT: Continued



Subroutine MOUNT: Continued

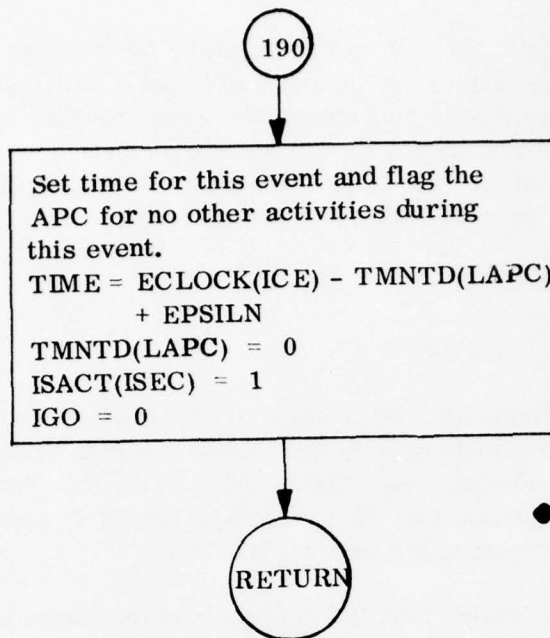


Subroutine MOUNT: Continued



Subroutine MOUNT: Continued

B-574



Subroutine MOUNT: Continued

Subroutine MVCON¹

PURPOSE: Subroutine MVCON is called by MAIN if the current element is a maneuver unit leader and is not a helicopter. MVCON then controls the movement of a maneuver unit by specifying its desired speed, direction, and formation patterns. Subroutine MOV then uses this information to actually perform movement of the elements in a maneuver unit.

CALLING SEQUENCE:

CALL MVCON

RESTRICTIONS: The proper sequencing of battlefield events as controlled by MVCON is heavily dependent upon data provided to the simulation before execution begins. It is, therefore, extremely important that the user have a thorough understanding of the common areas used by MVCON.

METHOD: Subroutine MVCON is organized into three logical sections depending upon the mission assigned to the maneuver unit, i.e., attacking maneuver units, delaying maneuver units, or supporting fire maneuver units.

COMMON AREAS REFERENCED:

| | | | |
|--------|--------|---------|---------|
| BREAK | KNTTAC | MINE | OBJY |
| DELTIM | KOBJ | MISION | *OUTPST |
| DIRMU | LCREW | MOVBAK | SPDMU |
| ECLOCK | LCSWFN | MUOBJ | TDELAY |
| FTMDEL | LDET | NAXIS | TIMADV |
| ICAP | LKILL | *NOUTFG | TIMDEL |
| ICAP1 | MANEUV | NPTS | XAXIS |
| ICECOM | MANLDR | NUMBER | XDP |
| IRAPUP | MFLAG2 | OBJX | XRT |
| | | | YRT |

¹The accompanying flow chart represents only the logic section changed during the contract period. Additions are noted with an asterisk and reference page numbers are from Land Combat Model, DYNCOM Programmer's Manual, Report RF 2376 FR 70-4B(U), Systems Research Group, The Ohio State University, Columbus, Ohio, April, 1970.

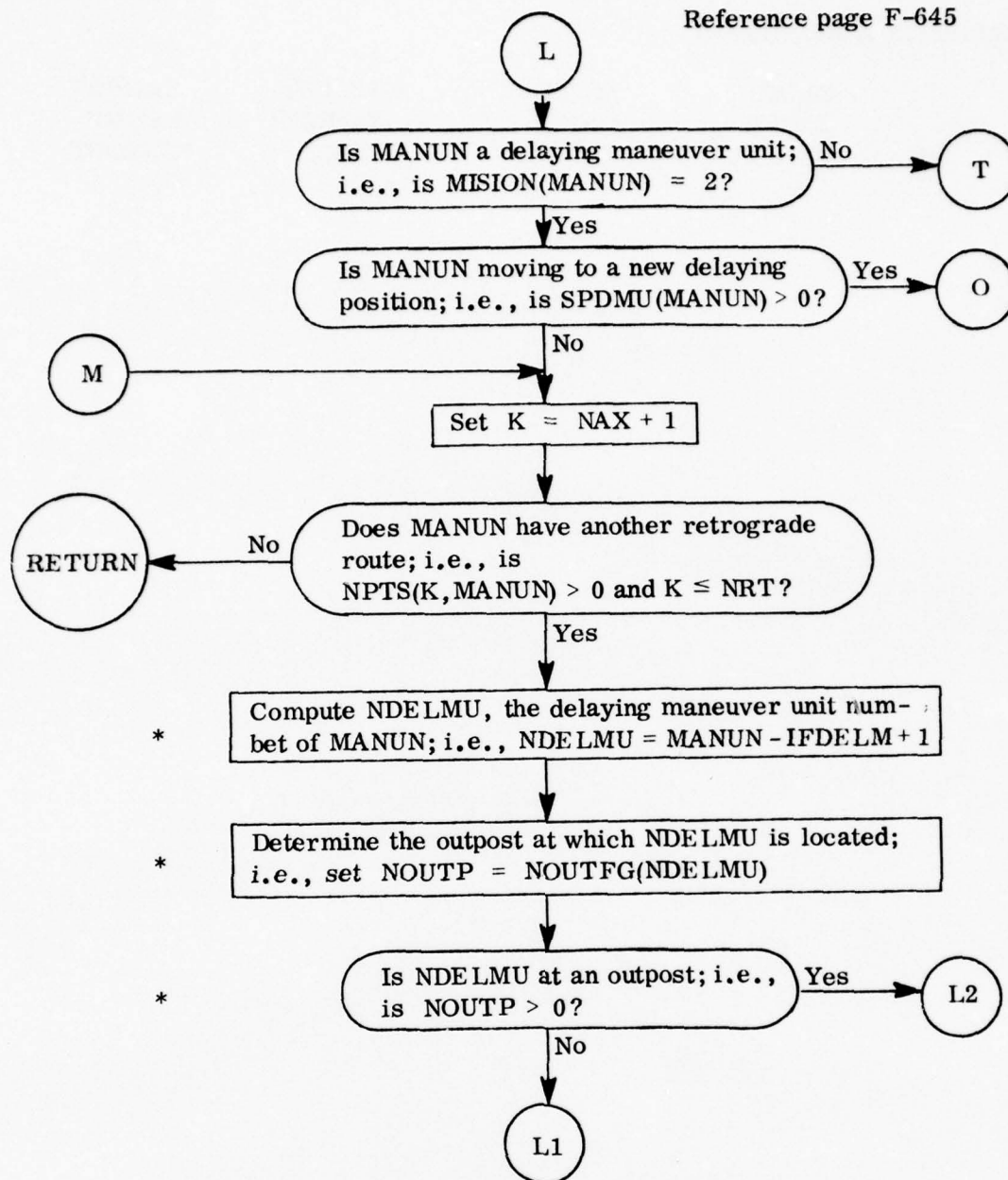
SUBROUTINES REQUIRED:

ELOC
ERROR
DELETK

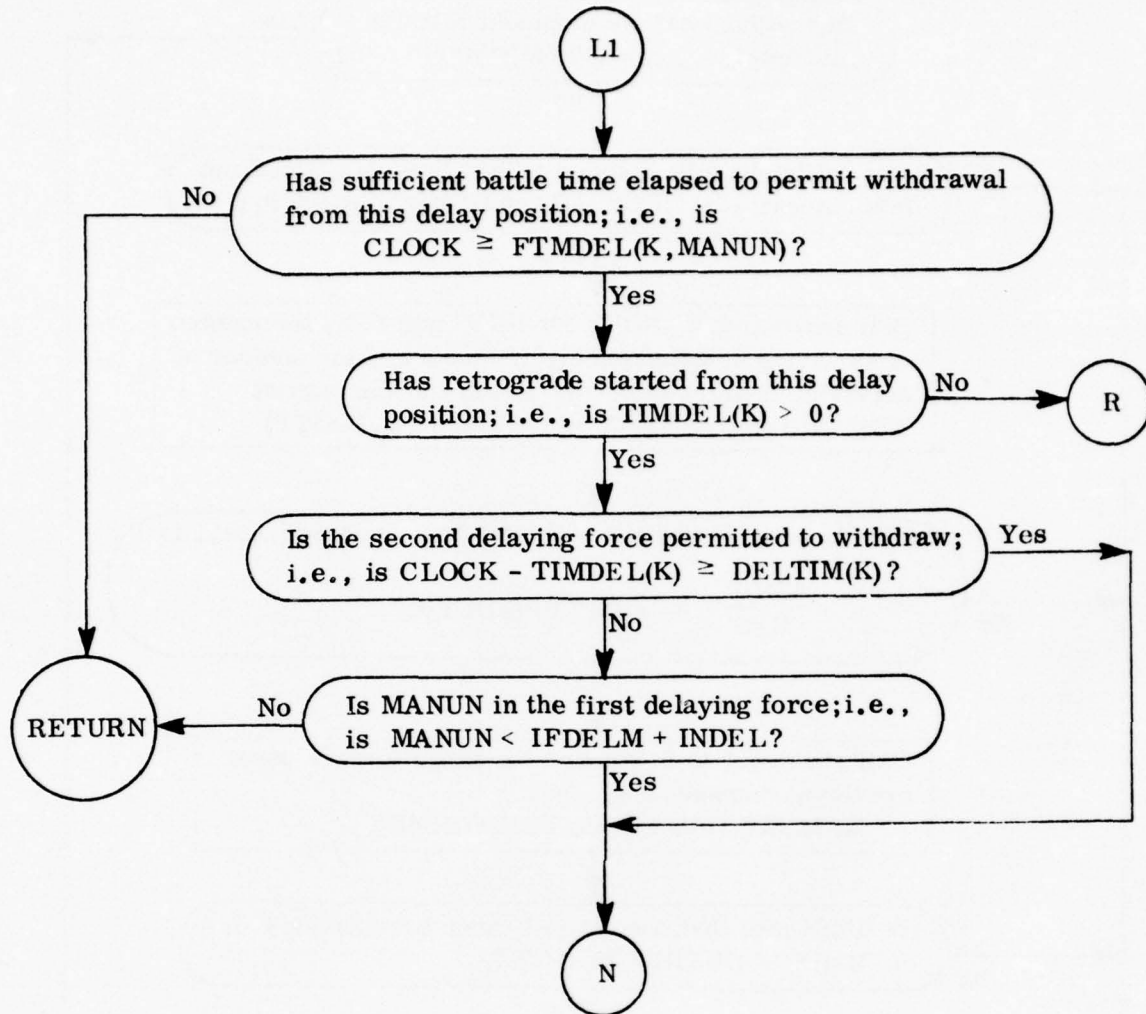
FORM
LOOK
MINOUT

MFLGST
MXMNRT
RTSEL

TACCNT
XYCMP
*CNTOUT



Subroutine MVCON: Movement Controller



Subroutine MVCON: Continued

Subroutine MVCON: Continued

B-580

Subroutine MXDSR

PURPOSE: Subroutine MXDSR is used to determine the most desirable grid point for crew-served weapon unit movement.

CALLING SEQUENCE:

CALL MXDSR (IMAX, JMAX, DESIRE, IF, JF, PARAM, *)

where

IMAX = number of grid rows

JMAX = number of grid columns

DESIRE = value of desirability for each grid point

(IF, JF) = row, column number for most desirable grid point

PARAM = parameter for calling sequence, negative for defensive-mode deployment, 0; for offensive mode deployment

* = non-standard return parameter

RESTRICTIONS:

called only from Subroutine CSWGRD

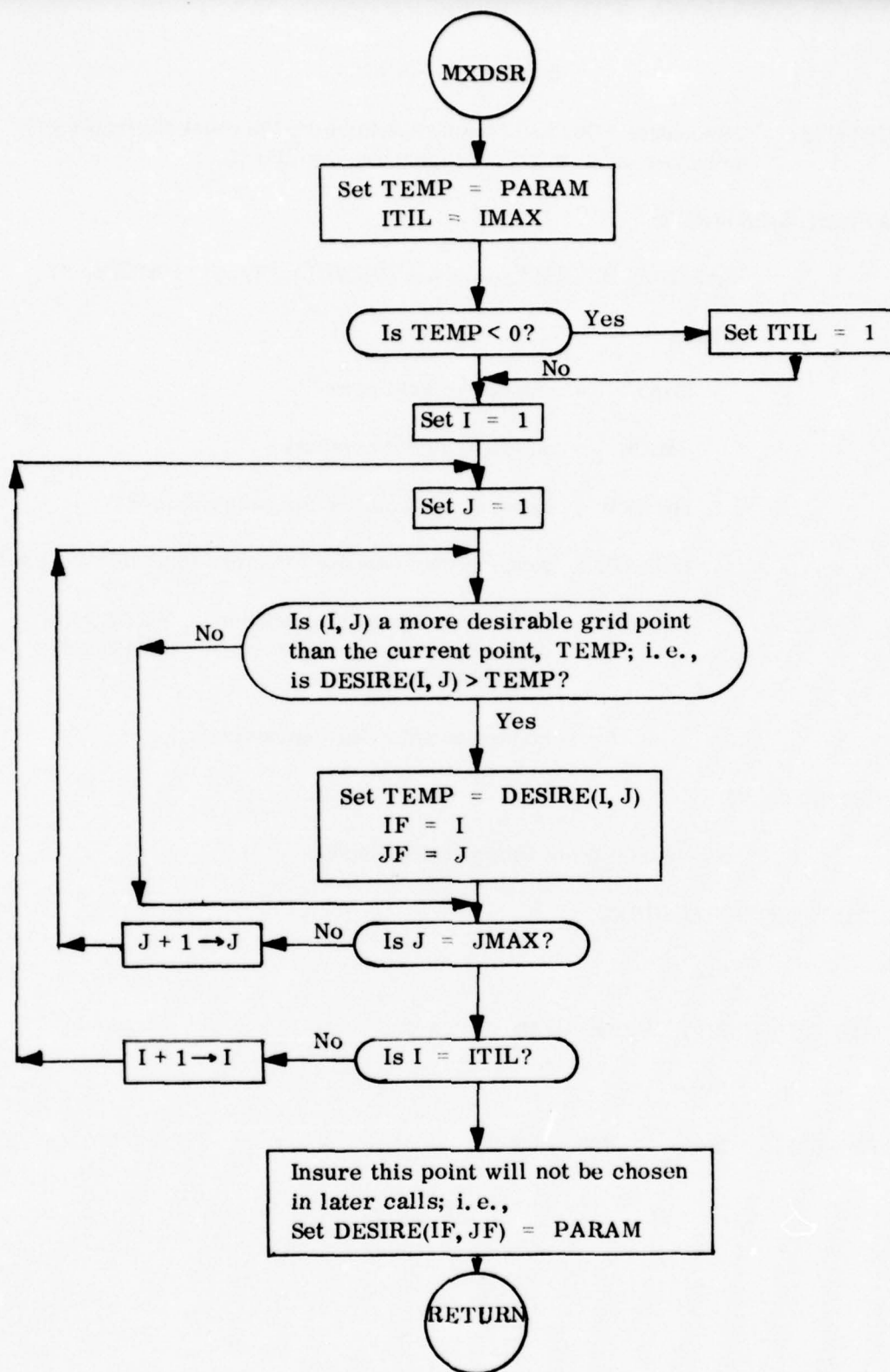
SUBROUTINES REQUIRED:

None

COMMON AREAS REFERENCED:

None

STORAGE: $29C_{16} = 668_{10}$ bytes



Subroutine MXDSR: Continued

B-582

Subroutine NATLDR

PURPOSE: Subroutine NATLDR is used to determine the proper maneuver unit leader for the aerial unit to which the current element belongs.

CALLING SEQUENCE:

CALL NATLDR(LDR)

where

LDR = element number for leader of maneuver unit

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| ICECOM | ITORG | MANTYP |
| IPORG | JUNACT | NAVSEC |
| ISORG | MANORG | |

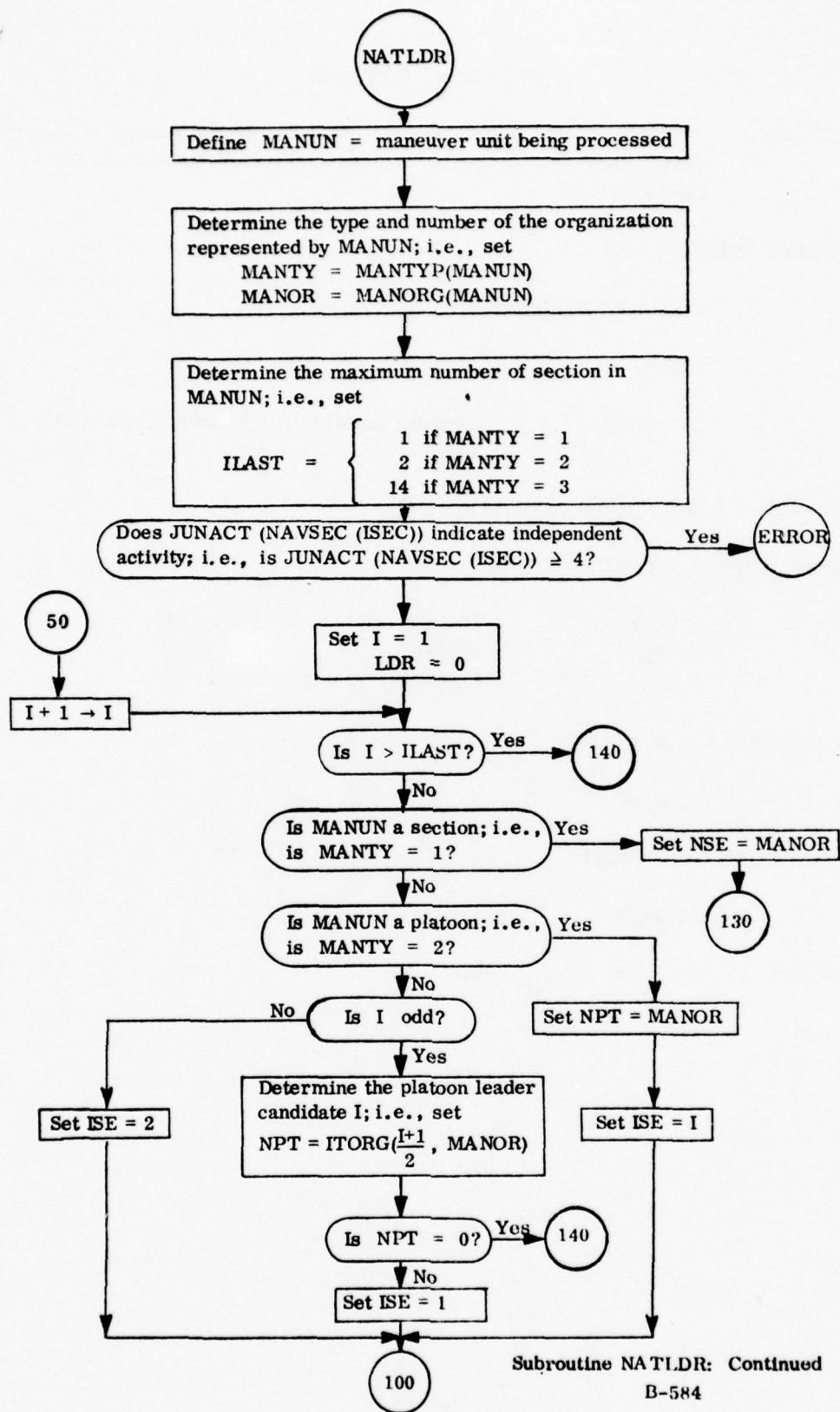
SUBROUTINES REQUIRED:

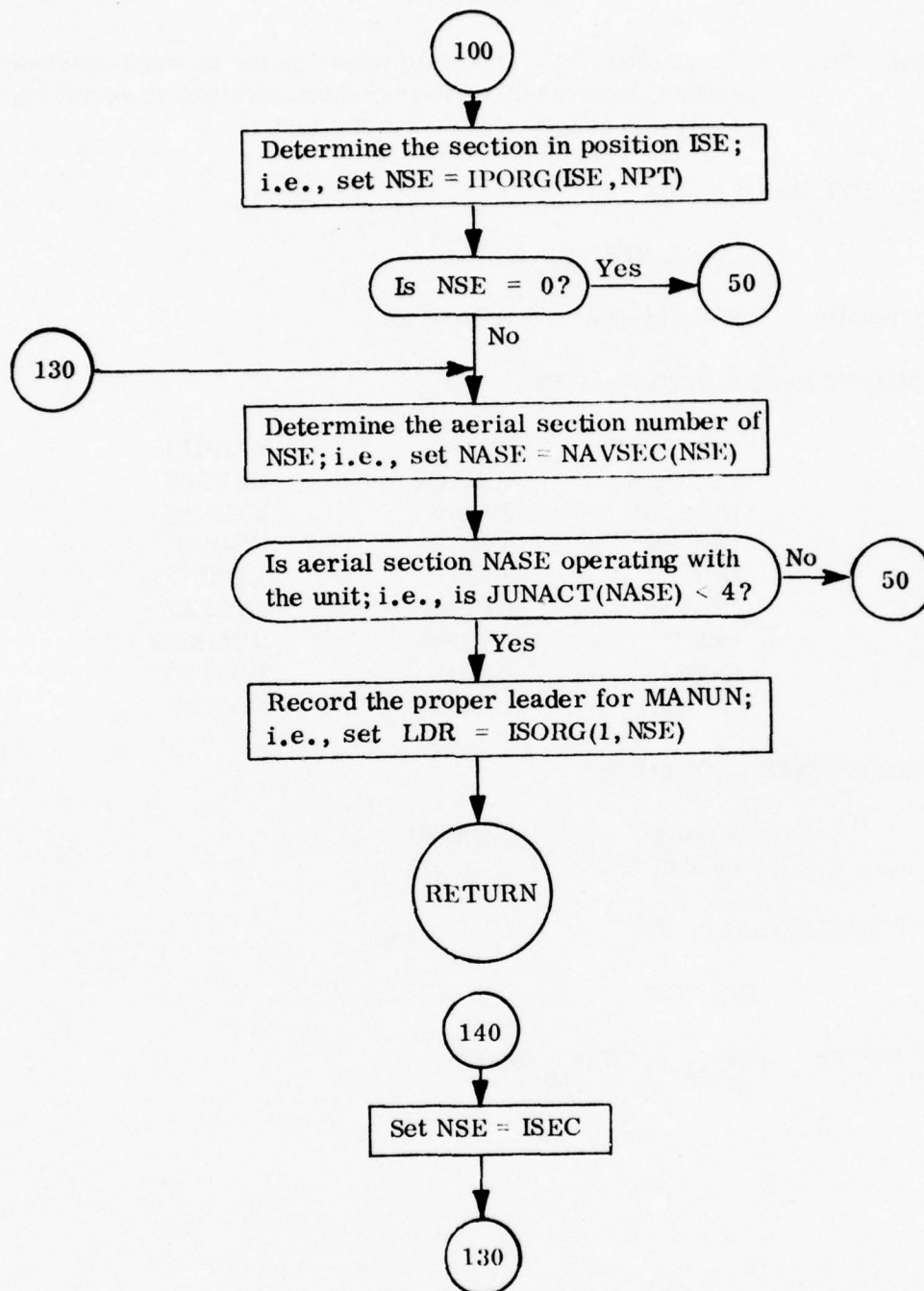
ERROR

NATLOR CALLED FROM:

FLGSET

LENGTH: $456_{16} = 1110_{10}$ bytes





Subroutine NATLDR: Continued

Subroutine NEWFO

PURPOSE: Subroutine NEWFO is used to assign the forward observer or MISTIC indirect-fire launcher function when an aerial section is first able to perform such a mission.

CALLING SEQUENCE:

CALL NEWFO

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| CF | ISORG | MANHEL |
| ECLOCK | IUNACT | NAVSEC |
| ICECOM | JUNACT | NMISUN |
| IFBMIS | KFO | NOBVH |
| IFMC | KFOD | NSTHFF |
| IFRFL | LFLAG | NTELE |
| IMIST | LFUNC | NUMBER |
| INART | LNUM | TDFRDY |
| IPHASE | LWCOD | TIFRDY |

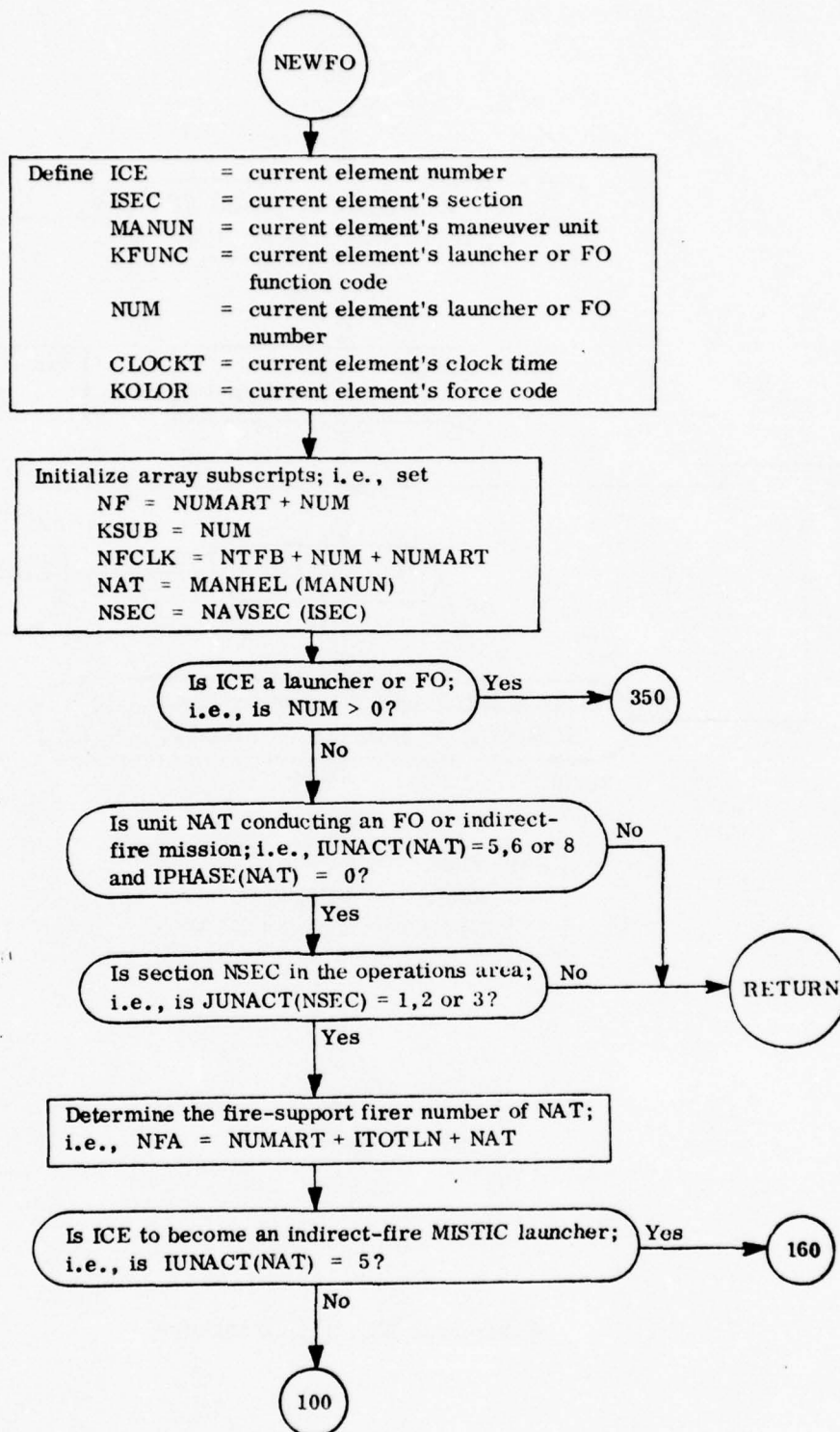
SUBROUTINES REQUIRED:

| | |
|-------|--------|
| AMMO | ISTHFF |
| ERROR | |

NEWFO CALLED FROM:

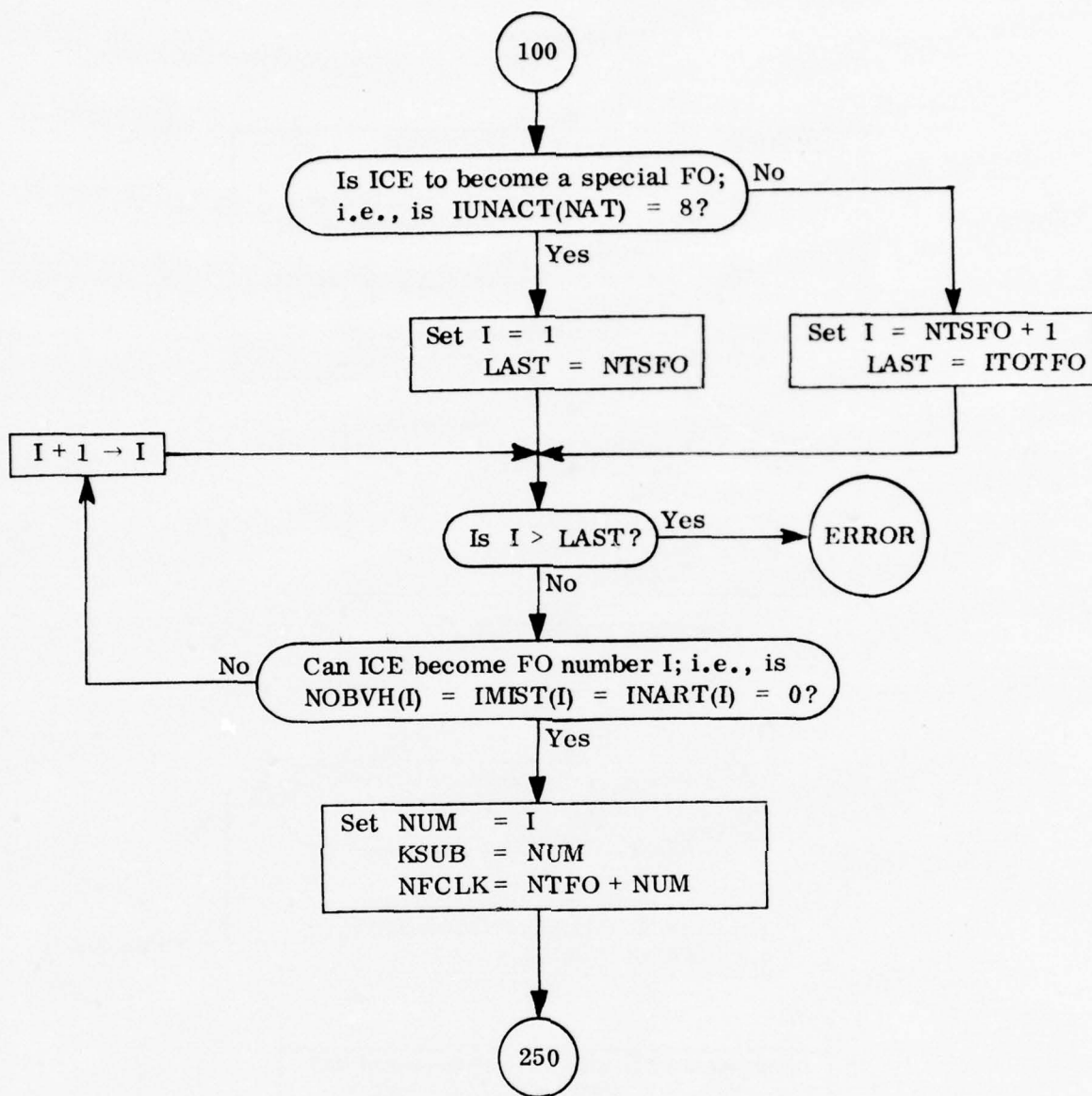
HELCON

STORAGE: $EA4_{16} = 3748_{10}$ bytes

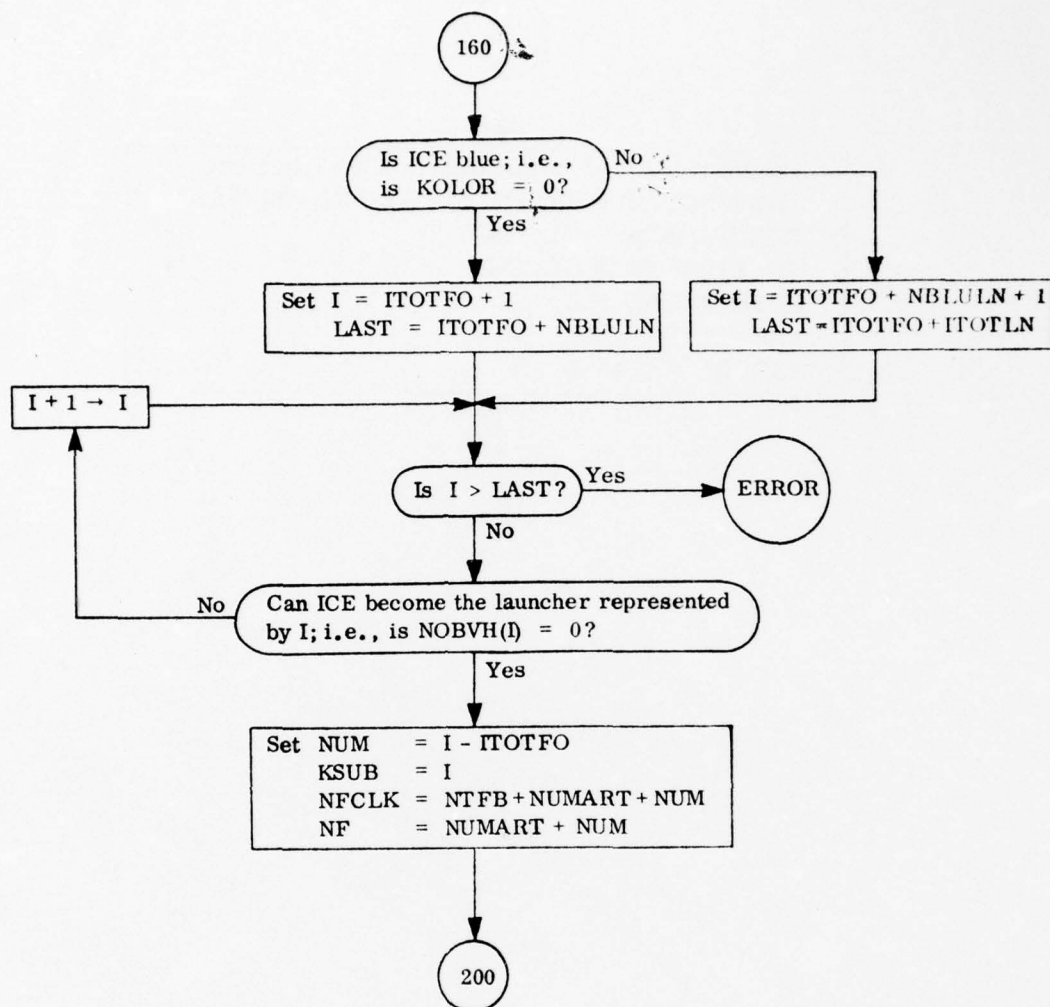


Subroutine NEWFO: Assigning Forward Observer and Launcher Functions

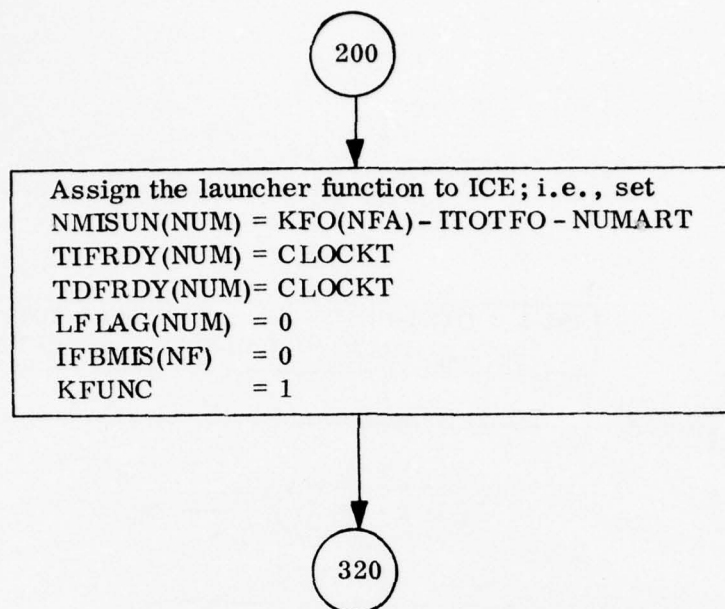
B-587



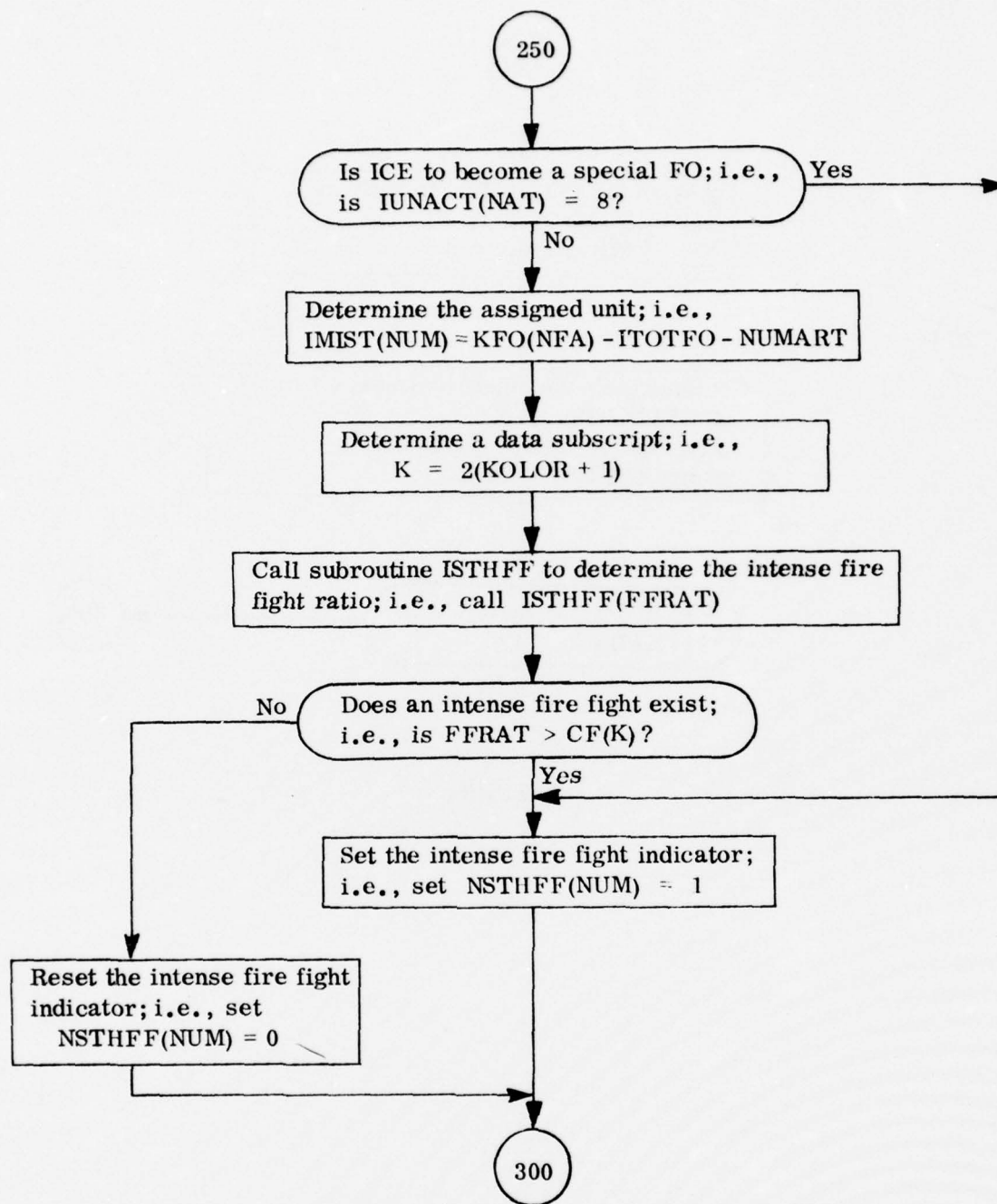
Subroutine NEWFO: Continued



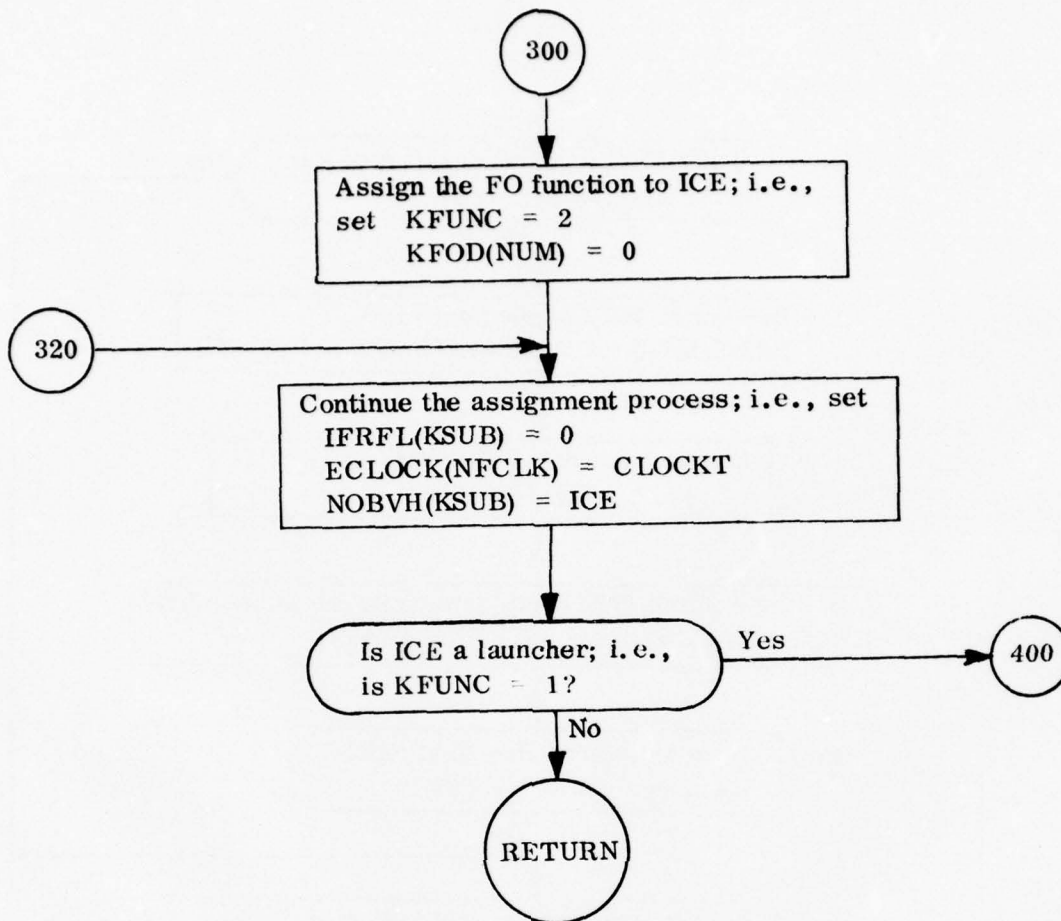
Subroutine NEWFO: Continued



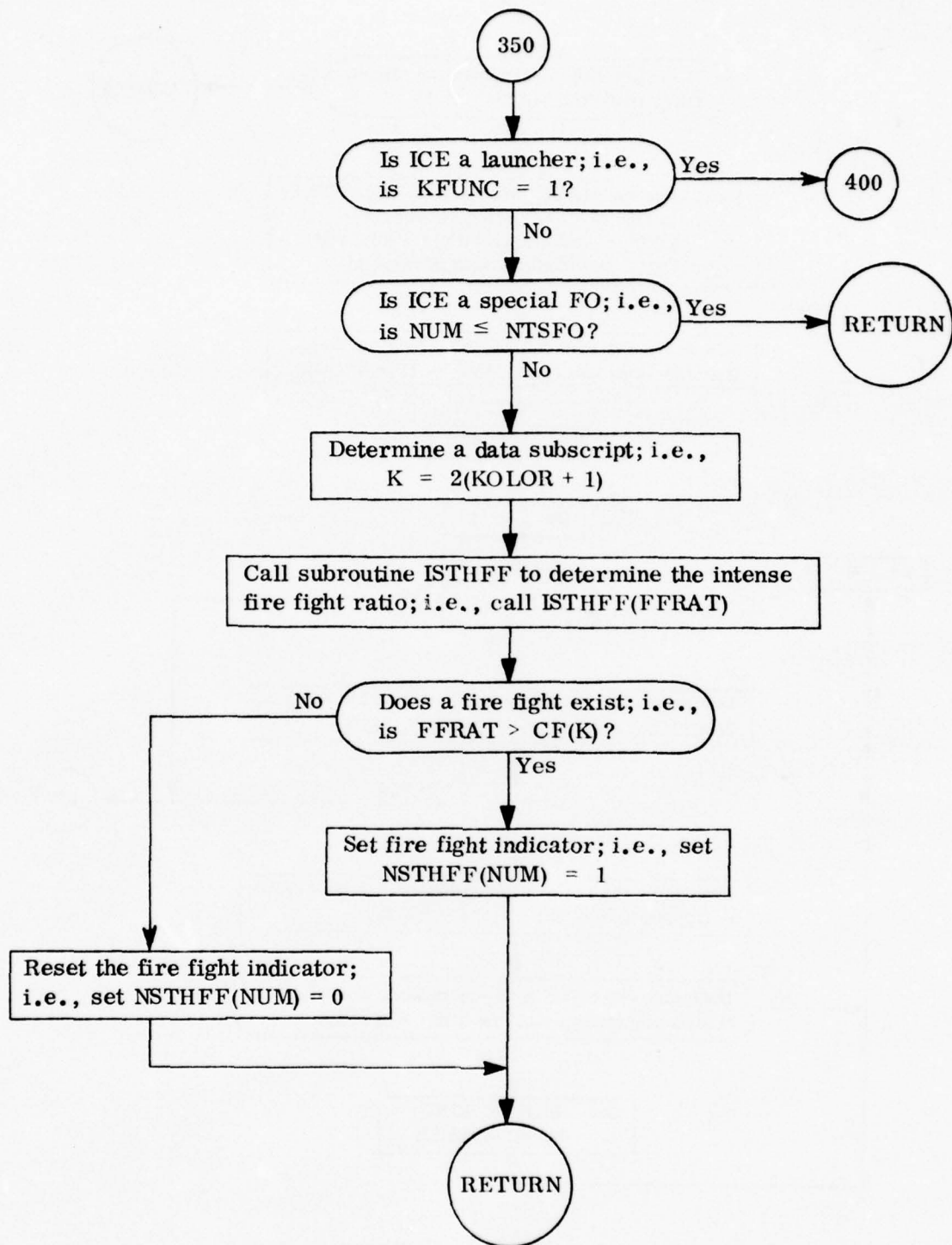
Subroutine NEWFO: Continued



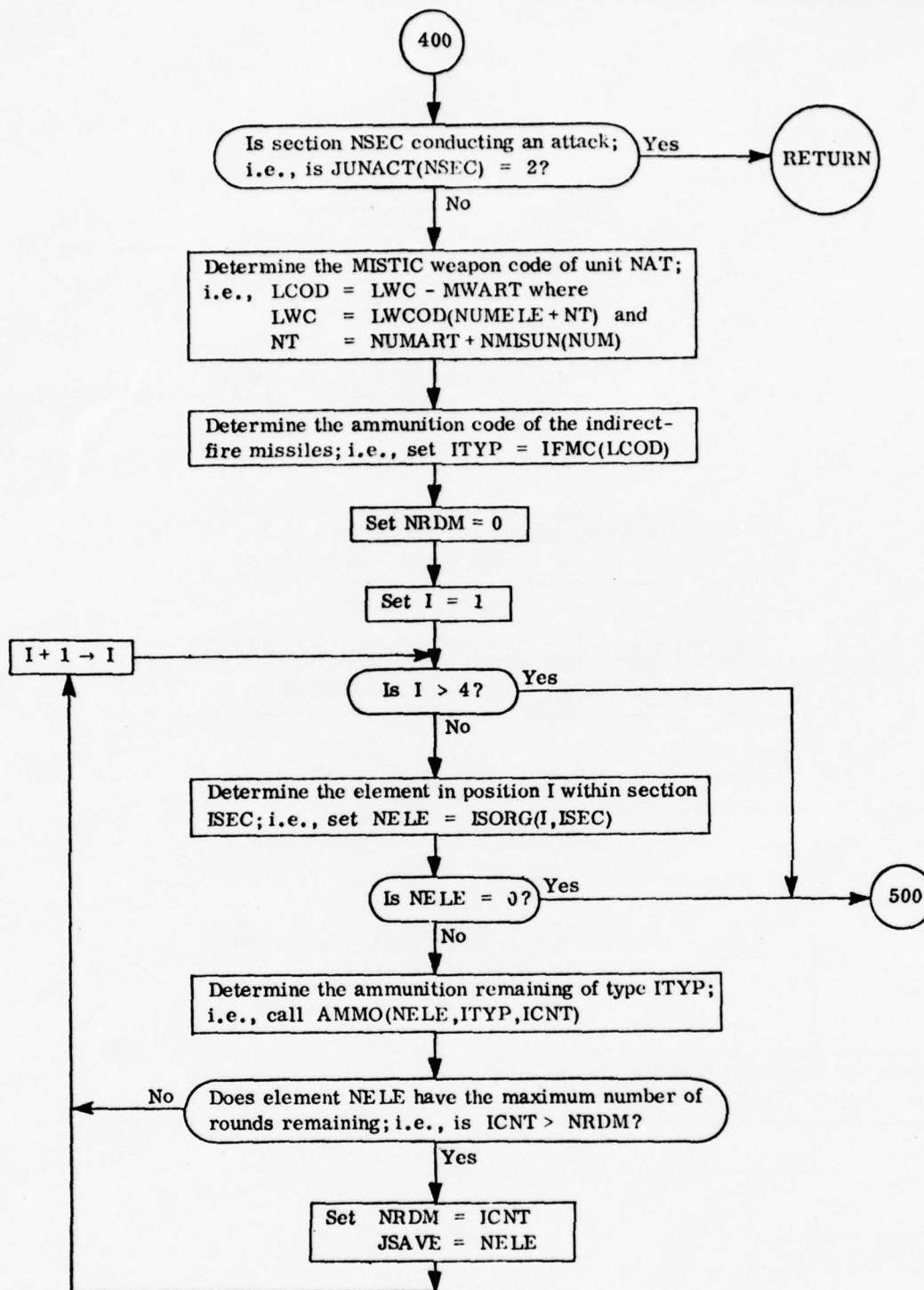
Subroutine NEWFO: Continued



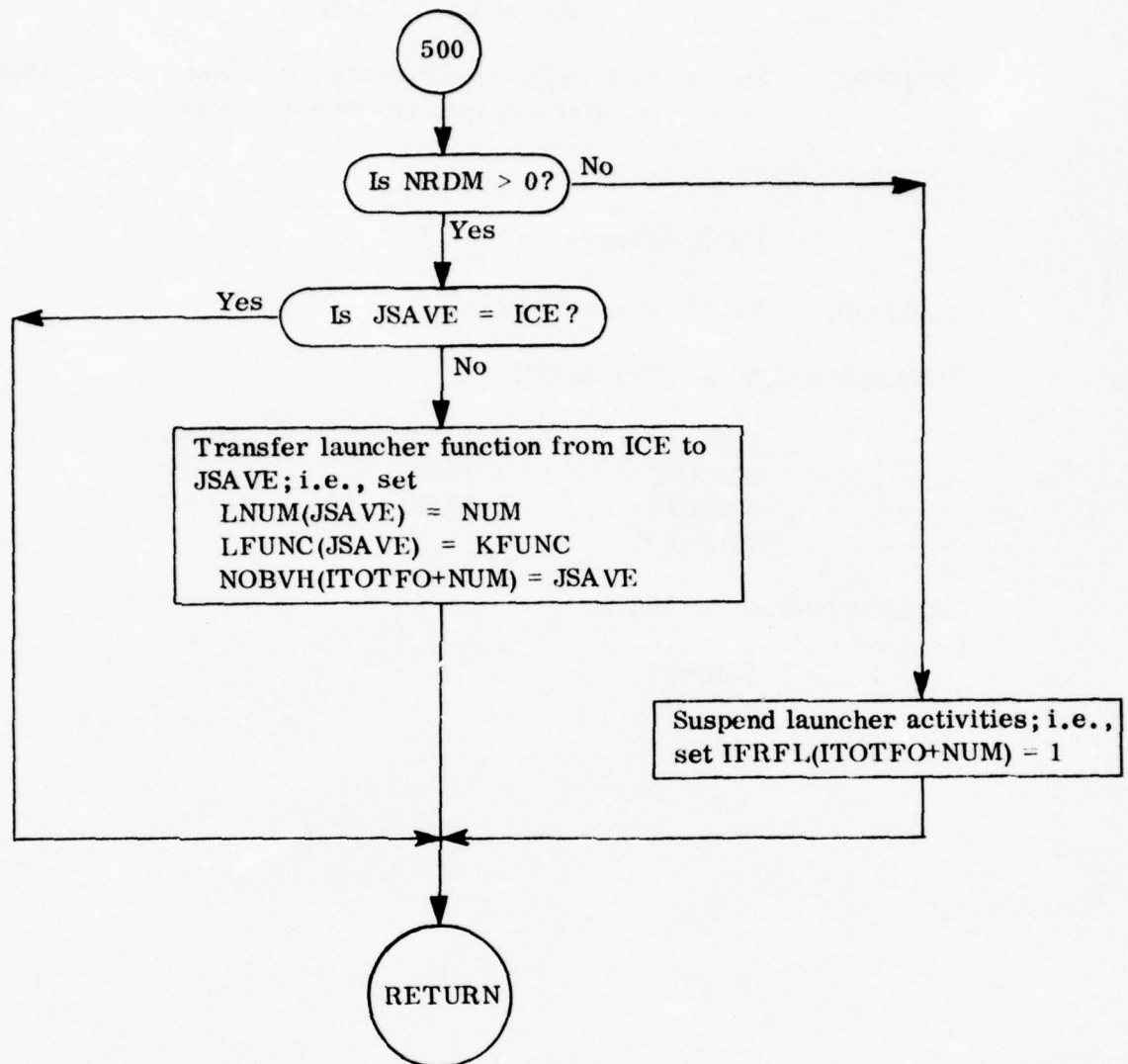
Subroutine NEWFO: Continued



Subroutine NEWFO: Continued



Subroutine NEWFO: Continued



Subroutine NEWFO: Continued

Subroutine NEWMIS

PURPOSE: Subroutine NEWMIS performs the bookkeeping required when an aerial maneuver unit commences a new mission.

CALLING SEQUENCE:

CALL NEWMIS

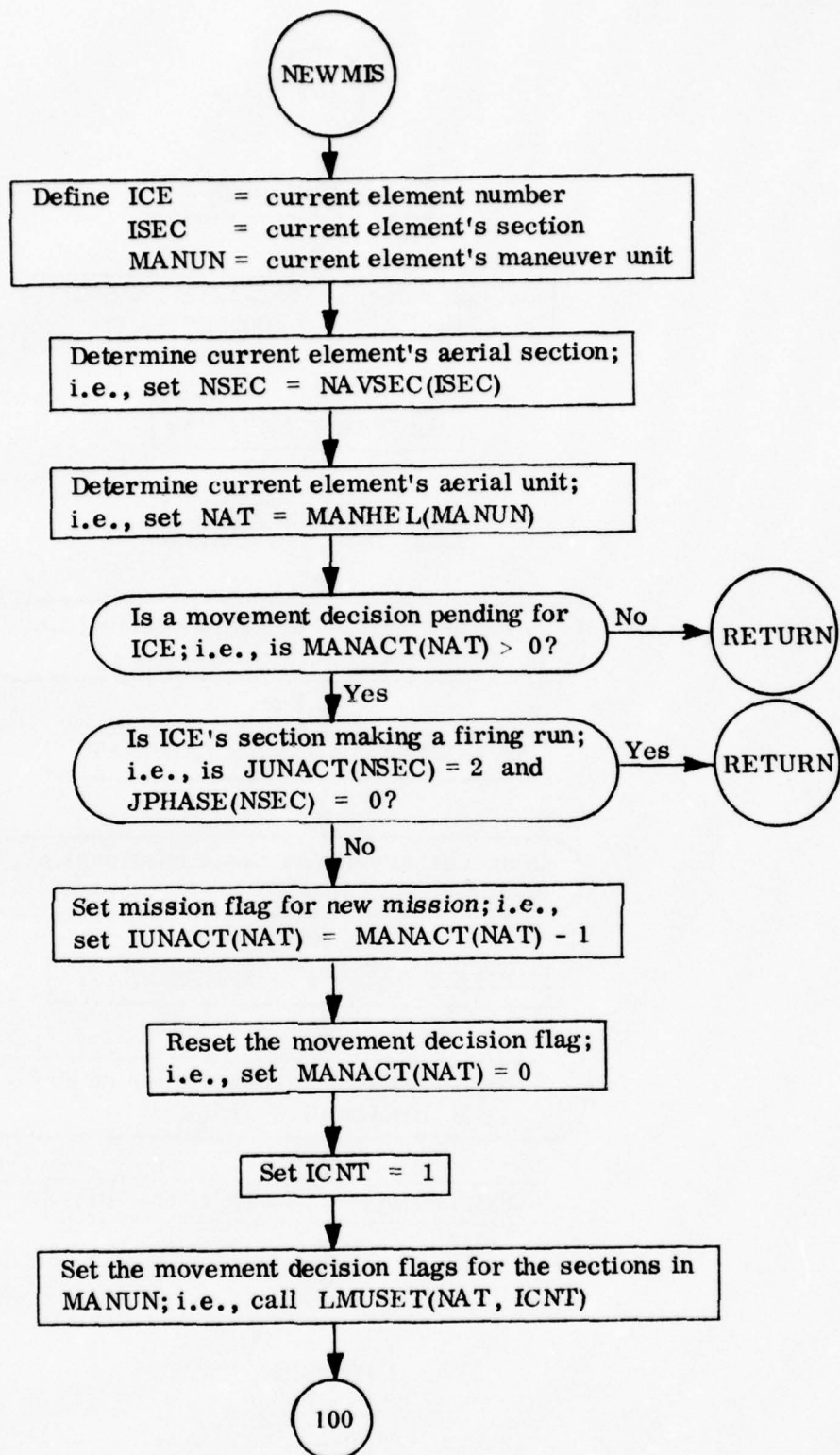
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| ICECOM | JUNACT | FORMSE |
| NAVSEC | JPHASE | IPHASE |
| MANHEL | IUNACT | MCLASS |
| MANACT | | |

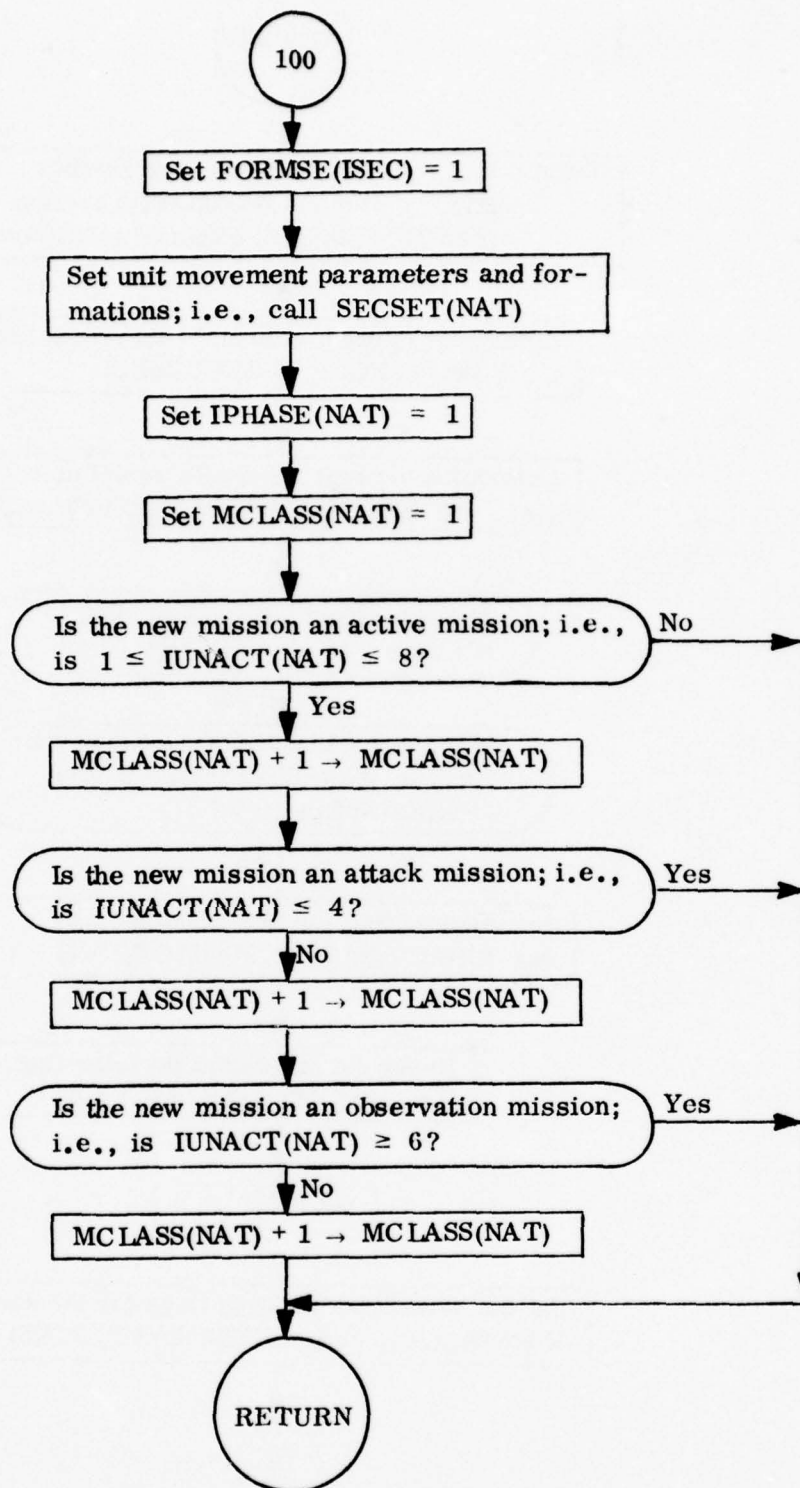
SUBROUTINES REQUIRED:

LMUSET
SECSET



Subroutine NEWMIS: Recording New Mission Parameters
for an Aerial Unit

B-597



Subroutine NEWMIS: Continued

Subroutine NUTARG

PURPOSE: Subroutine NUTARG is called by subroutine FLIGHT to assign a target to an in-flight missile. The subroutine is used for in-direct fire support where a MISTIC forward observer has requested missile fire at an enemy target complex. This routine picks an enemy element within a fixed distance of the aim point of the complex and assigns it as the target of the missile.

CALLING SEQUENCE:

CALL NUTARG

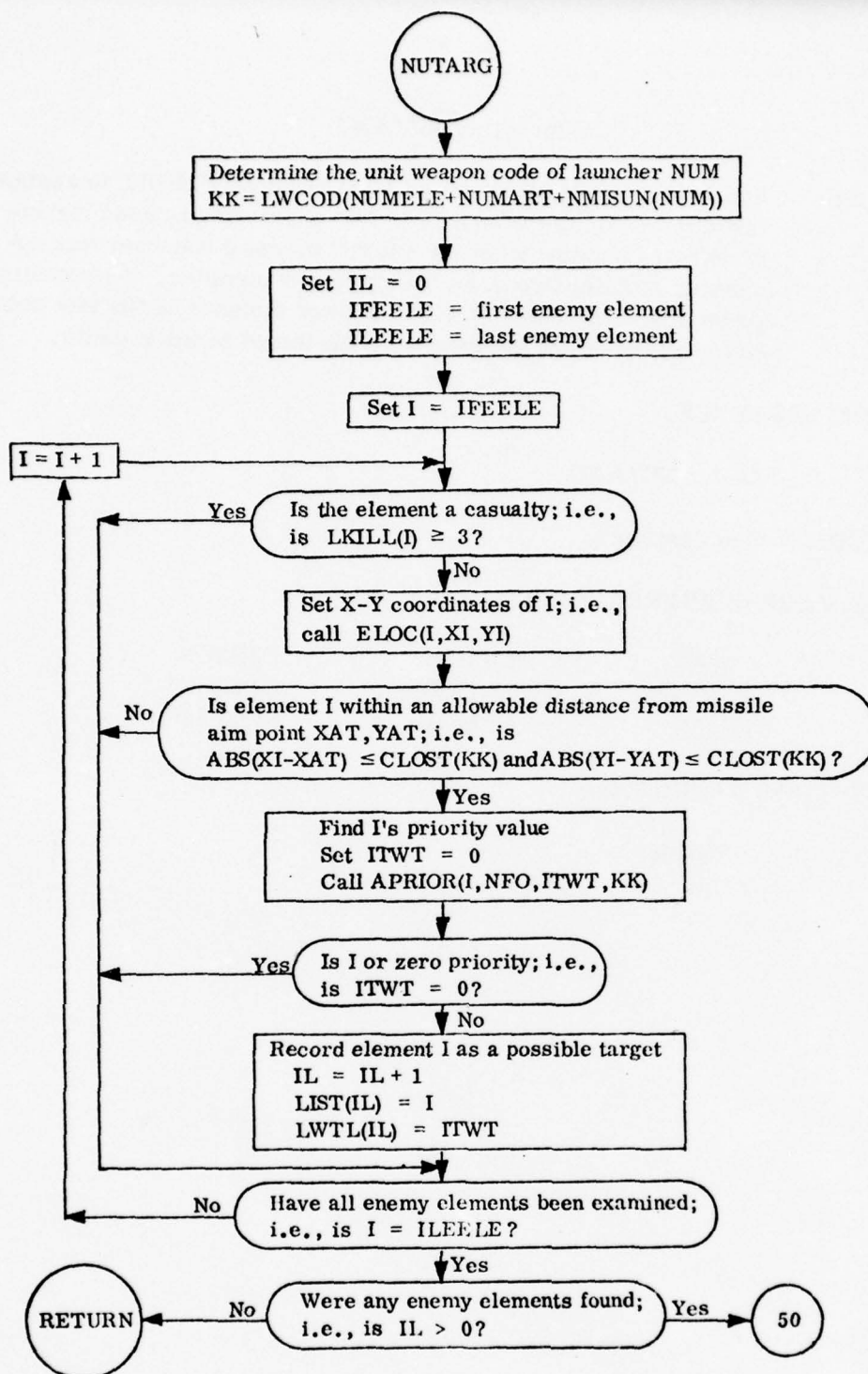
METHOD: See Chapter 5.

COMMON AREAS REFERENCED:

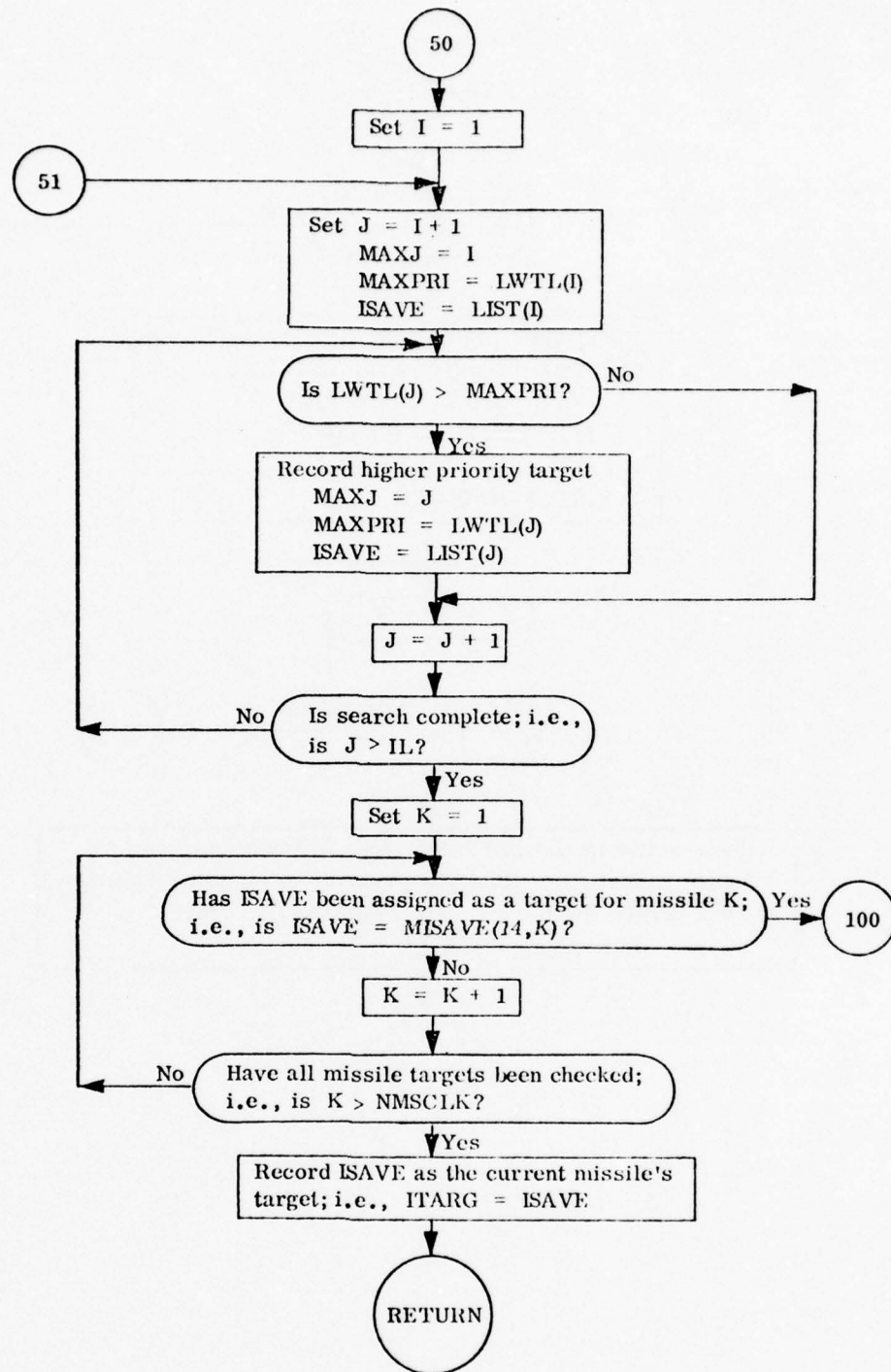
| | | |
|--------|--------|--------|
| CLOSE | LNSET | NMISUN |
| ICECOM | LWCOD | OPEN |
| LKILL | MISAVE | SEQPAR |

SUBROUTINES REQUIRED:

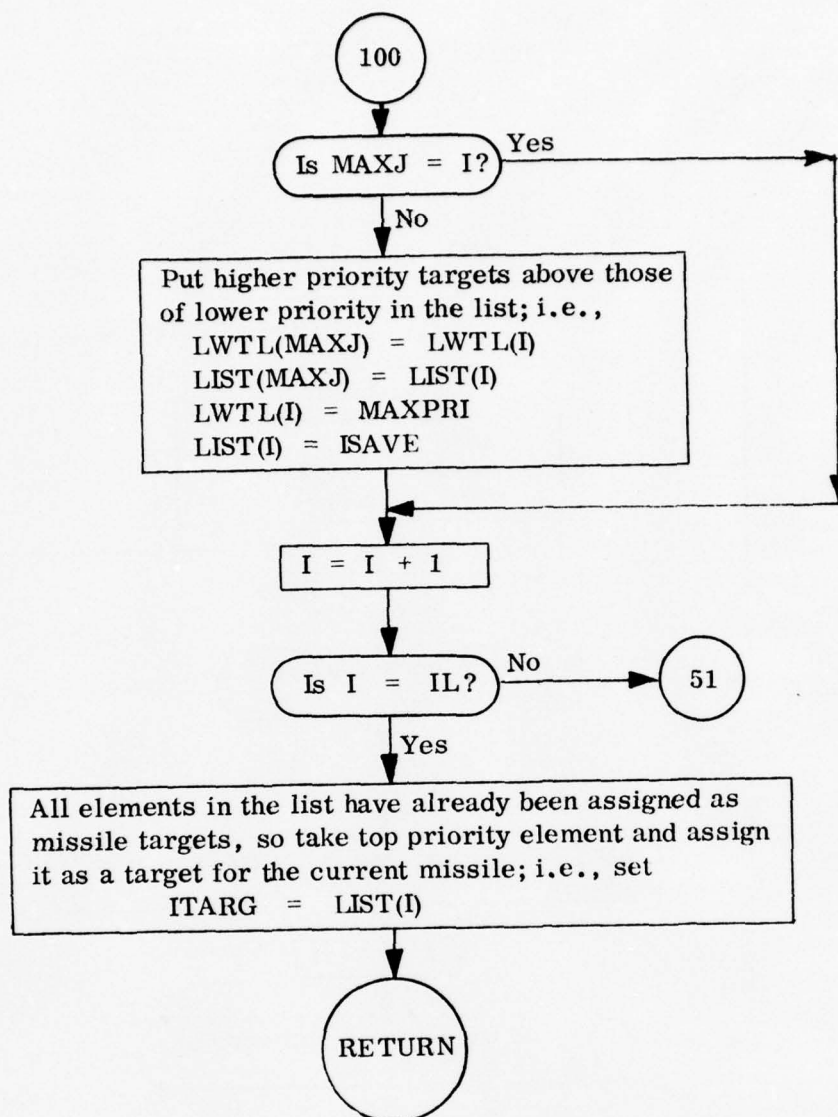
APRIOR
ELOC



Subroutine NUTARG: Determining the Illumination Target
for a MESTIC Missile



Subroutine NUTARG: Continued



Subroutine NUTARG: Continued

Subroutine NUTARG

PURPOSE: Subroutine NUTARG selects a target to be illuminated by a forward observer during the flight of a semi-active missile. This target is selected in the vicinity of specified target coordinates, and the highest priority target intervisible with and detected by the forward observer is selected.

CALLING SEQUENCE:

CALL NUTARG

RESTRICTIONS: None

METHOD: See "Level and Ballistic Flight," Chapter 2 in Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| CLOSE | LWCOD | NUMBER |
| ICECOM | MAINPR | OPEN |
| LKILL | MISAVE | SETPAR |
| LNSET | NMISUN | |

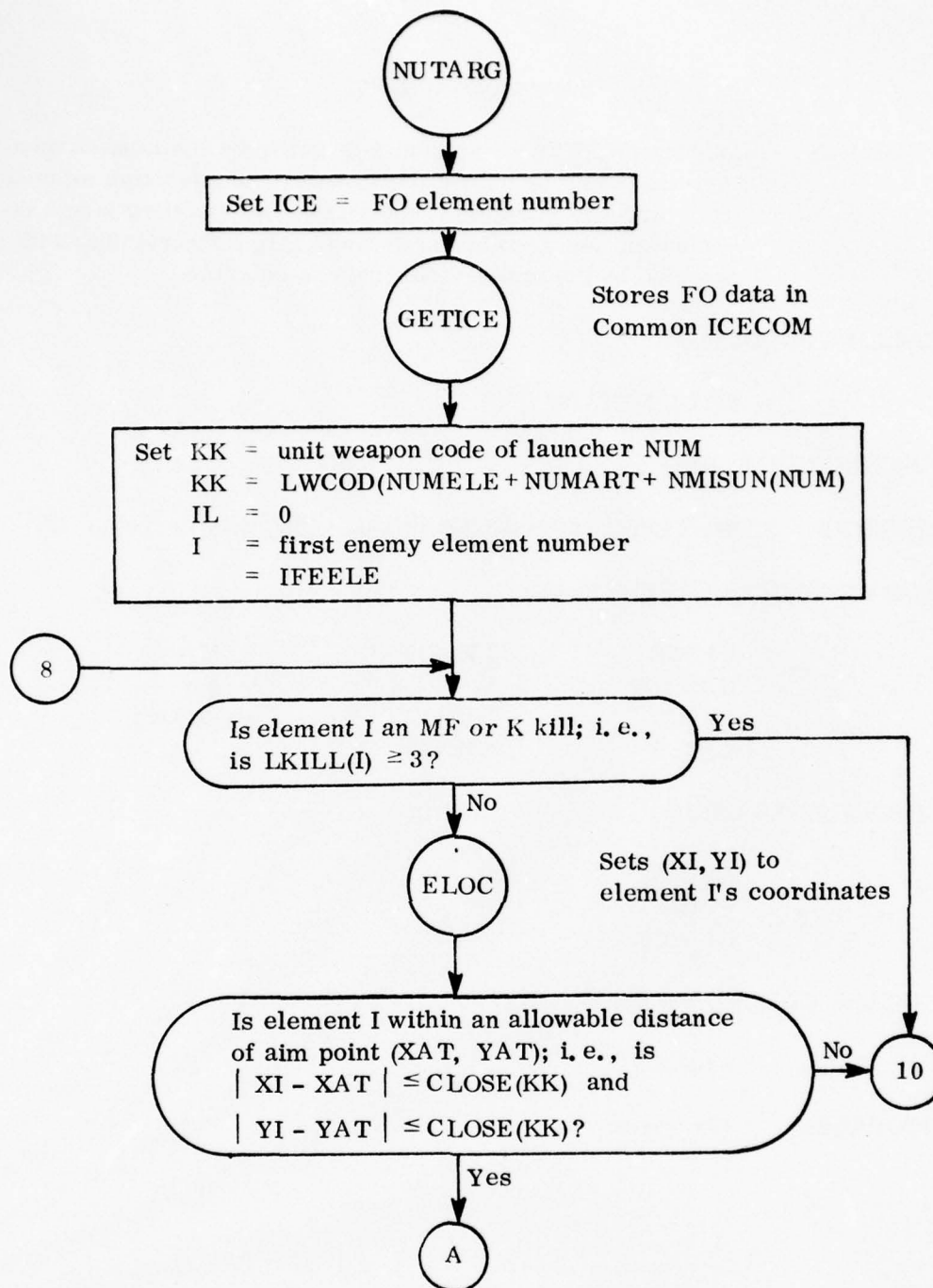
SUBROUTINES USED:

APRIOR
ELOC
GETICE

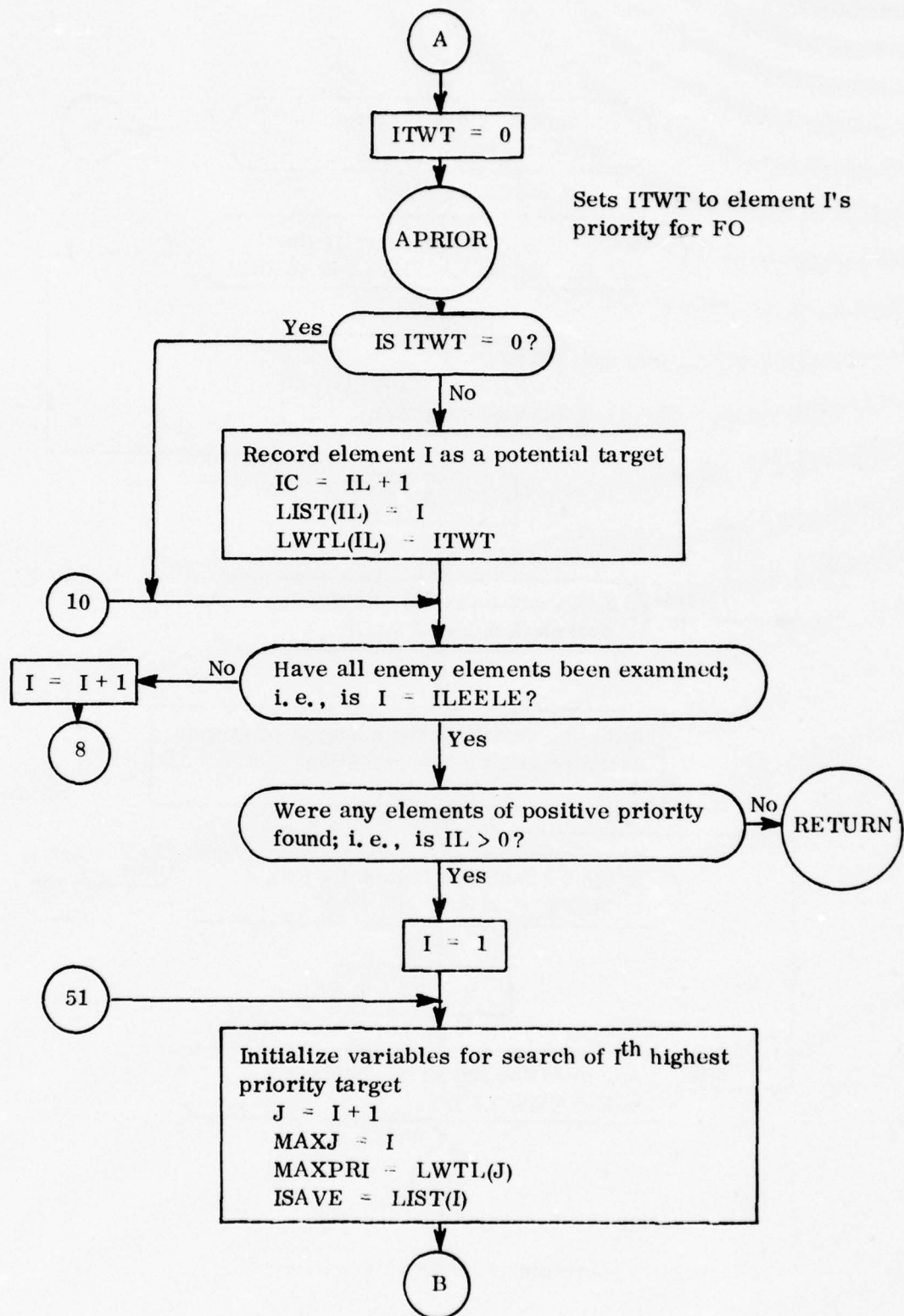
NUTARG CALLED FROM:

FLIGHT

STORAGE: 472 words



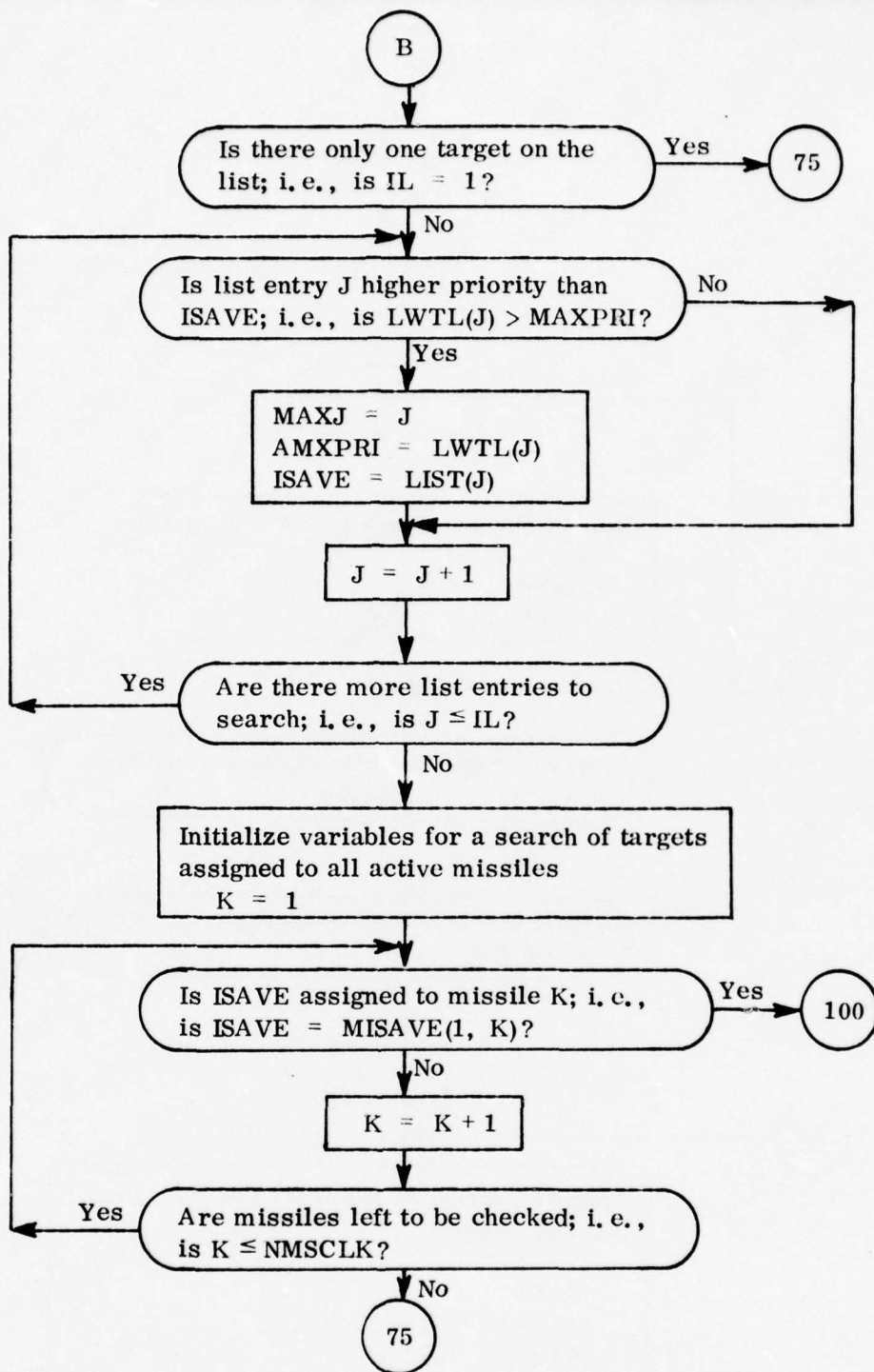
Subroutine NUTARG: Selecting a Target for a Missile



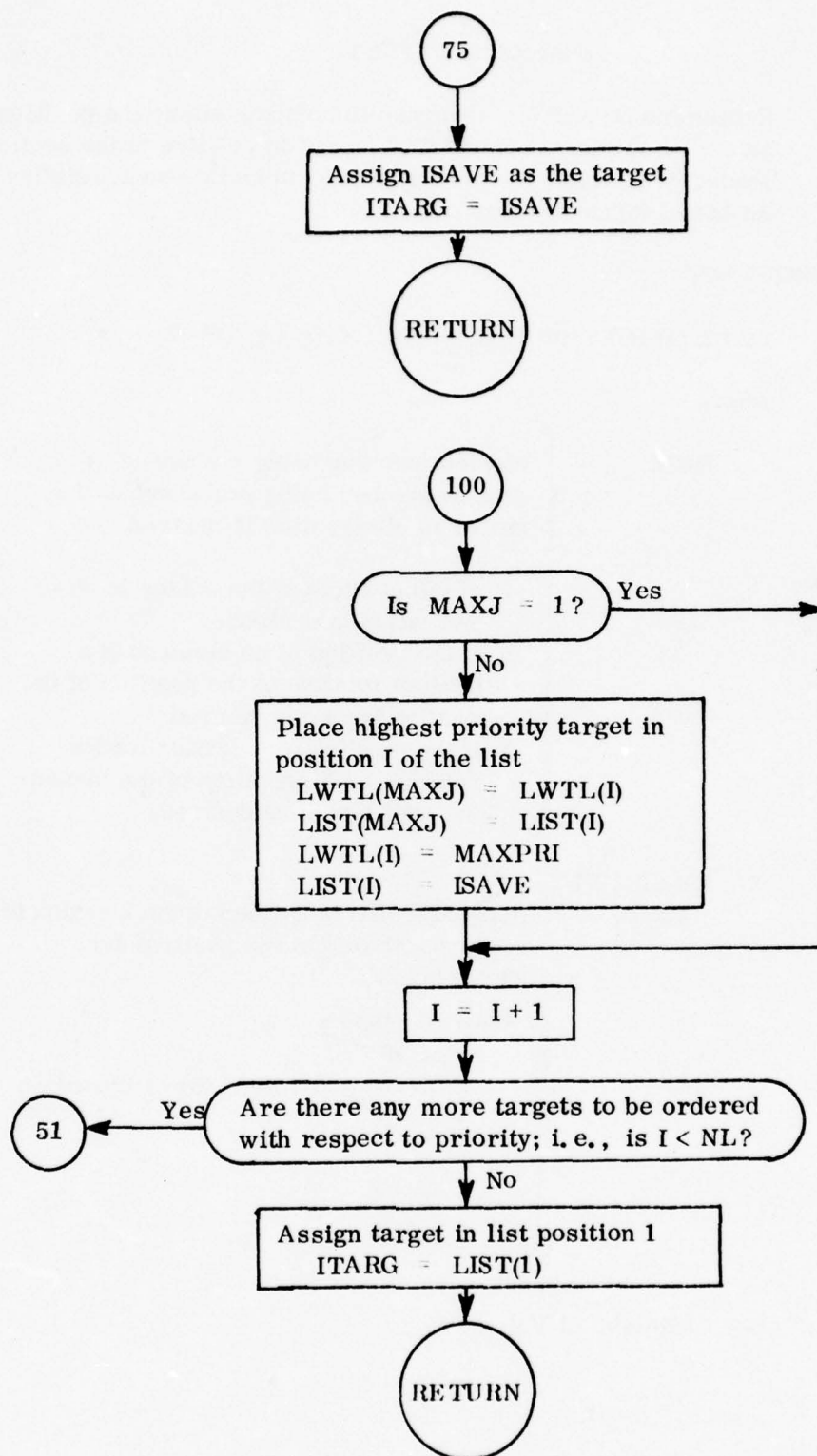
Sets ITWT to element I's
priority for FO

Subroutine NUTARG: Continued

B-605



Subroutine NUTARG: Continued



Subroutine NUTARG: Continued

B-607

Subroutine OFFSET

PURPOSE: Subroutine OFFSET is designed to compute either the position of an aerial section's center of observation relative to the section's leader or the formation position of an aerial element relative to an aerial formation leader.

CALLING SEQUENCE:

CALL OFFSET(IHCE, ICNT, DELX, DELY, DELZ)

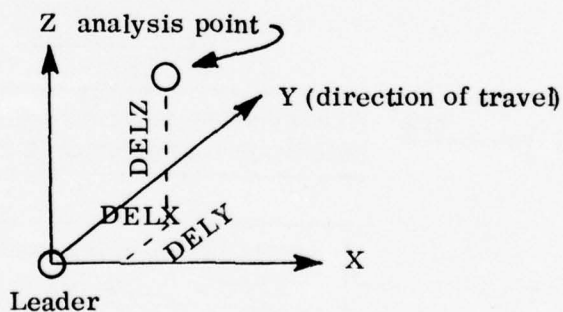
where

IHCE = { element number being processed or
section number being processed if the
center of observation is desired

ICNT = { -1 if the position of the center of ob-
servation is desired
0 if the position of an element in a
section relative to the position of the
section leader is desired
1 if the position of a section leader
relative to the position of the maneu-
ver unit leader is desired

DELX, DELY,

DELZ = computed offsets defined in the coordinate system with origin and positive axes shown below.



METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | | |
|--------|--------|--------|--------|
| FORMPT | FORMXS | ISPAR | LPOS |
| FORMSE | FORMYS | ISPOS | LSEC |
| FORMSX | FORMZS | ISORG | MANHEL |
| FORMSY | HFORMS | IUNACT | MANORG |
| FORMSZ | ICECOM | JUNACT | MANTYP |
| FORMTE | IPPOS | LMANU | NAVSEC |

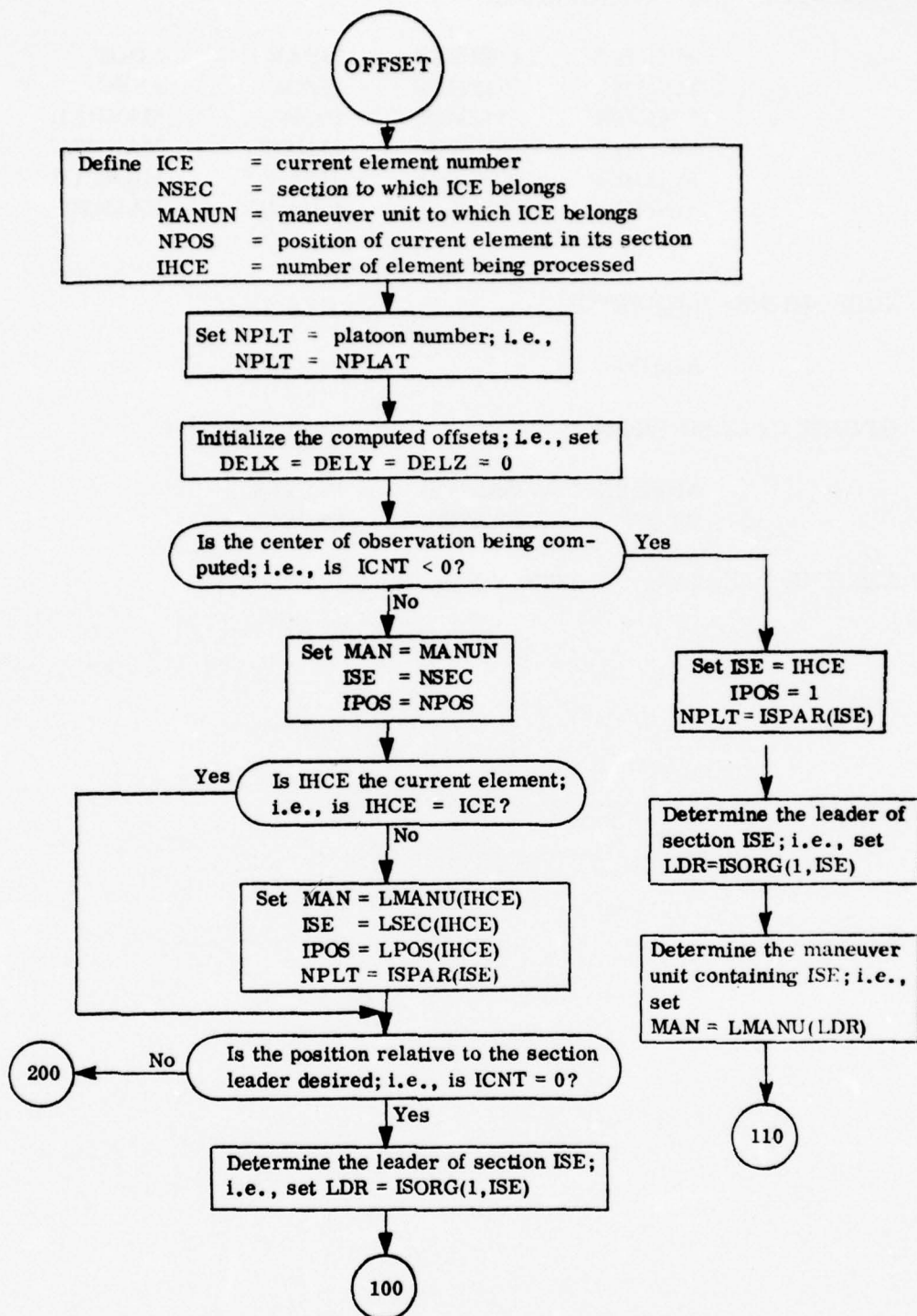
SUBROUTINES REQUIRED:

ADJPOS

OFFSET CALLED FROM:

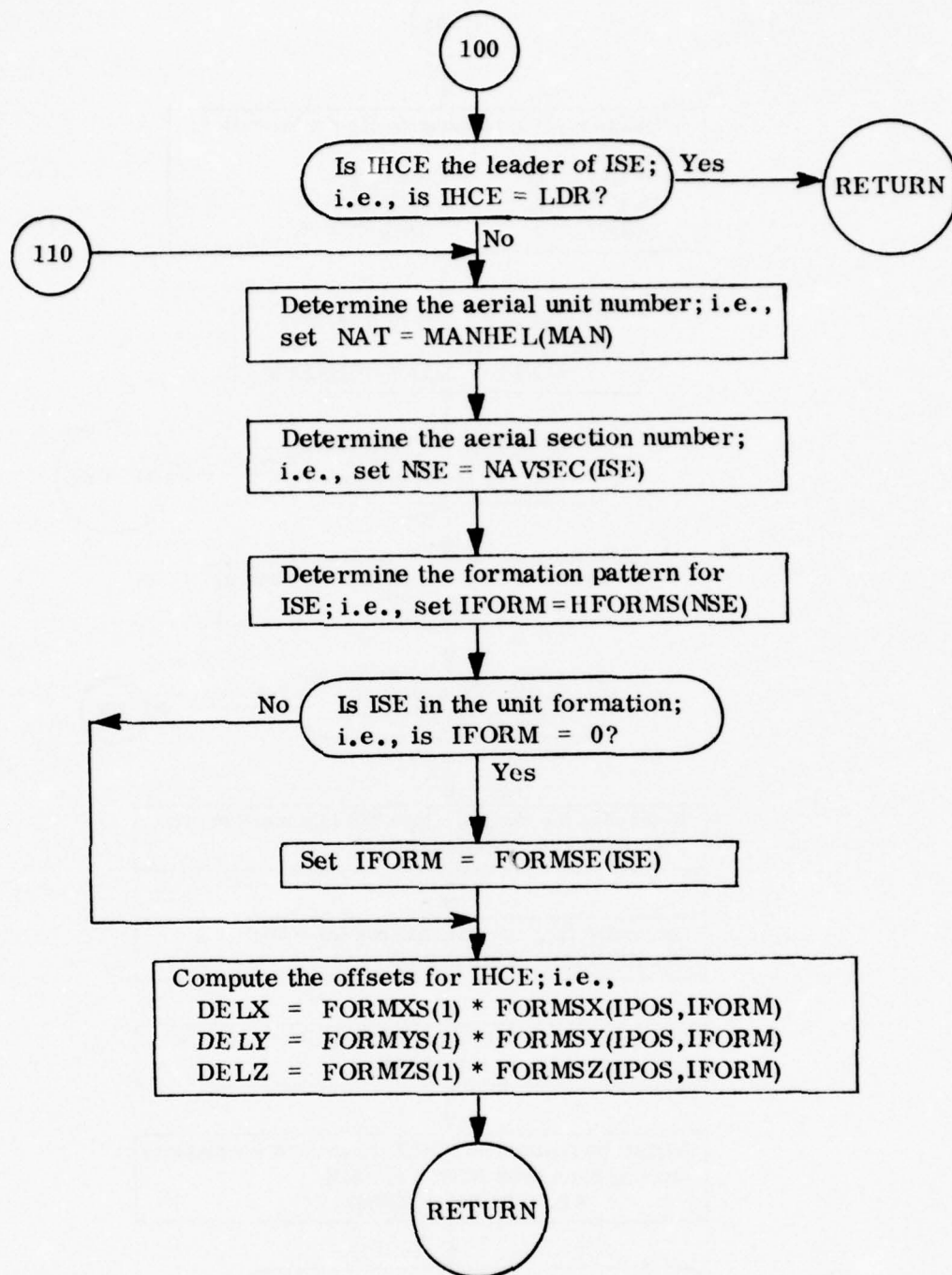
| | | |
|--------|--------|--------|
| APFDYS | HELMOV | INTELL |
| RTJOIN | RTSECT | SECSET |

LENGTH: $7A8_{16} = 1960_{10}$ bytes

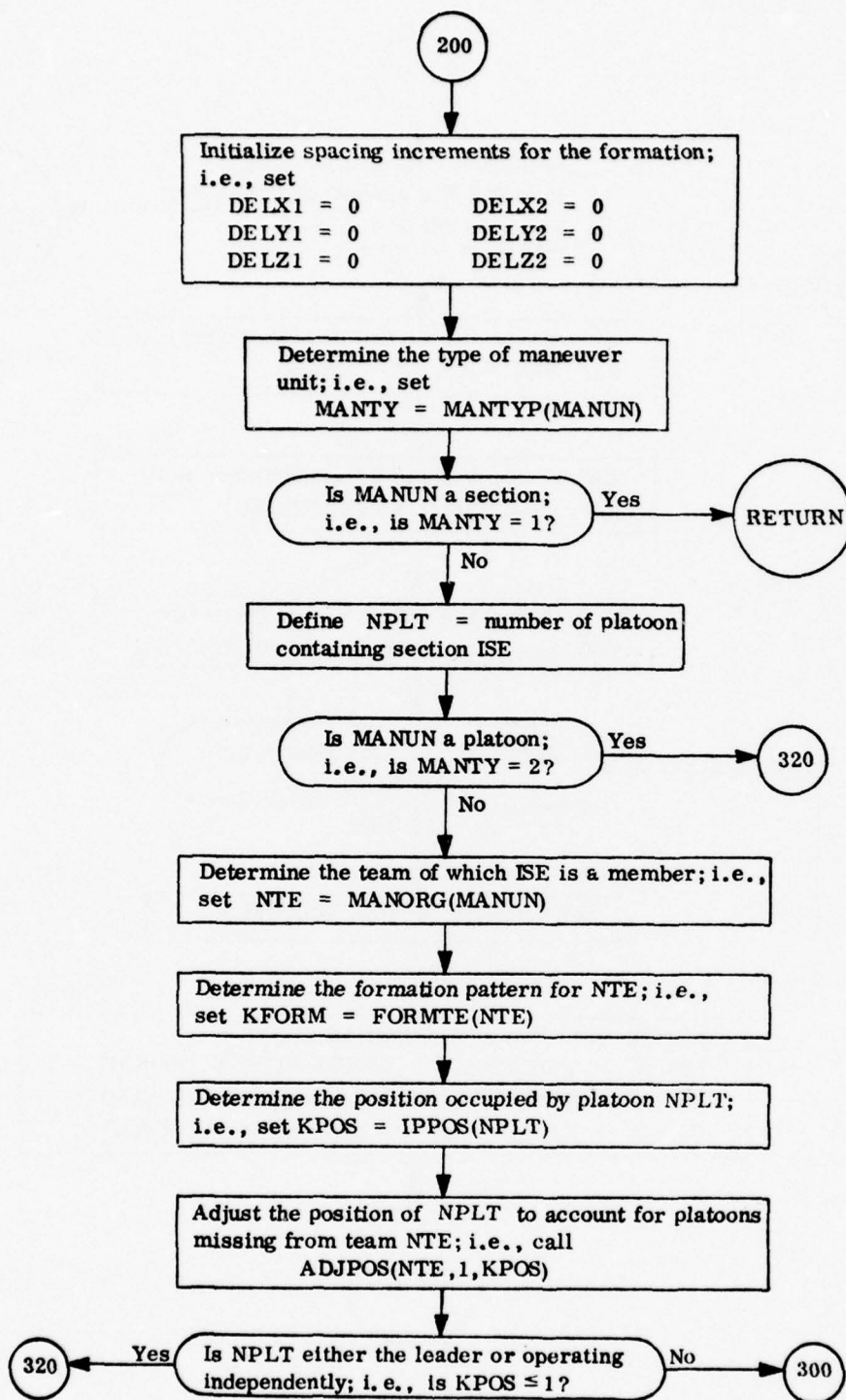


Subroutine OFFSET: Formation Offsets for an Aerial Element

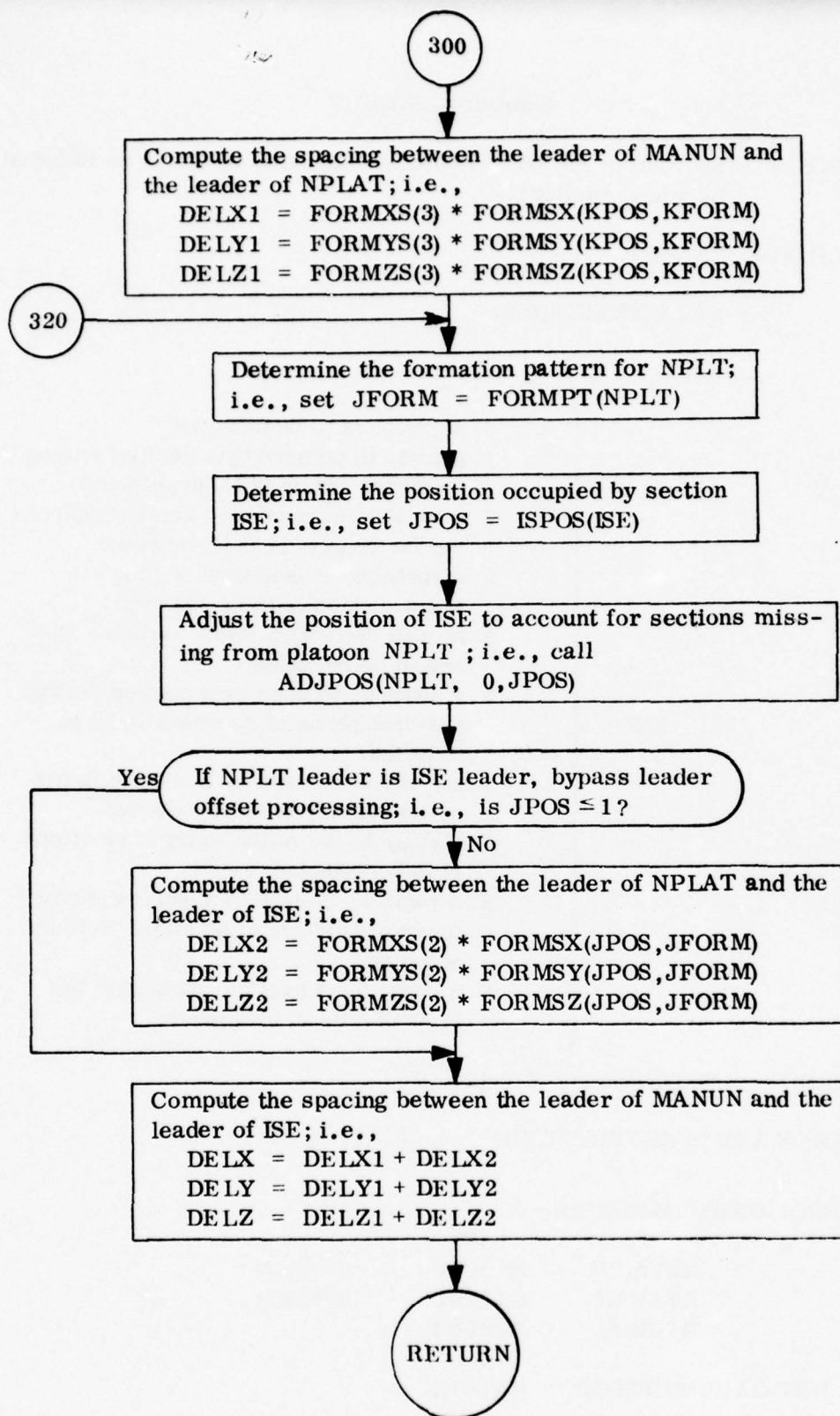
B-610



Subroutine OFFSET: Continued



Subroutine OFFSET: Continued
B-612



Subroutine OFFSET: Continued

B-613

Subroutine PICKRT

PURPOSE: Subroutine PICKRT is used to determine routes to be followed by aerial sections.

CALLING SEQUENCE:

CALL PICKRT(IRS)

where

IRS =

- 0 no route is to be selected
- 1 a route to be used by a section joining a unit formation is to be selected
- 2 a route to be used by a section searching for targets is to be selected
- 3 a route to be used by a section at a loiter station is to be selected
- 4 arrays defining a loiter station route are to be reloaded
- 5 a route to be used by a section during the first phase of an attack is to be selected
- 6 a route to be used by a section flying cross country is to be selected
- 7 a route to the initial point of an attack is to be selected
- 8 a route to be used by a section during the second phase of an attack is to be selected
- 9 a route for a section flying in a unit formation is to be selected

METHOD: See Chapter 6 of Volume 1.

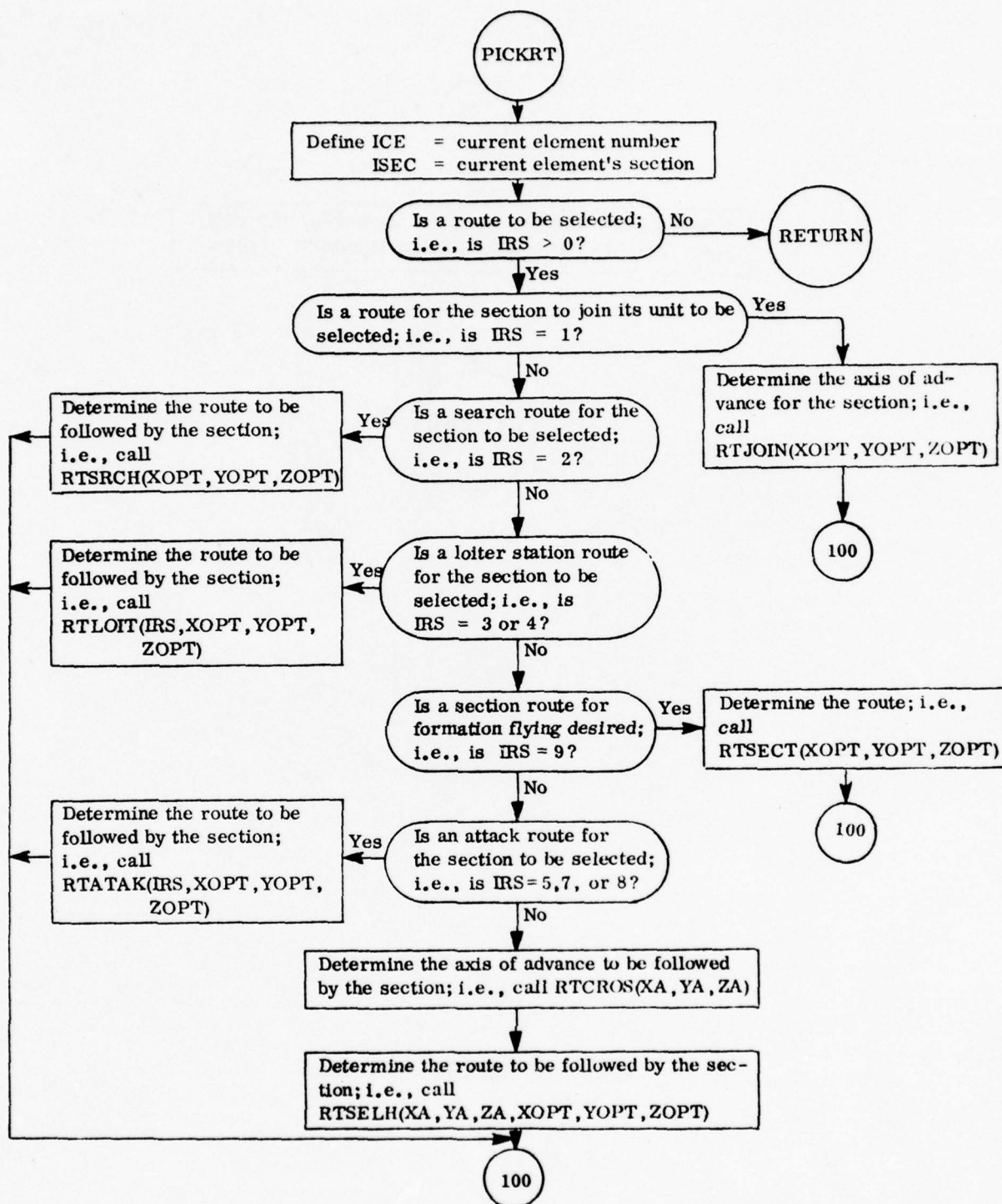
COMMON AREAS REFERENCED: ICAP, ICECOM

SUBROUTINES REQUIRED:

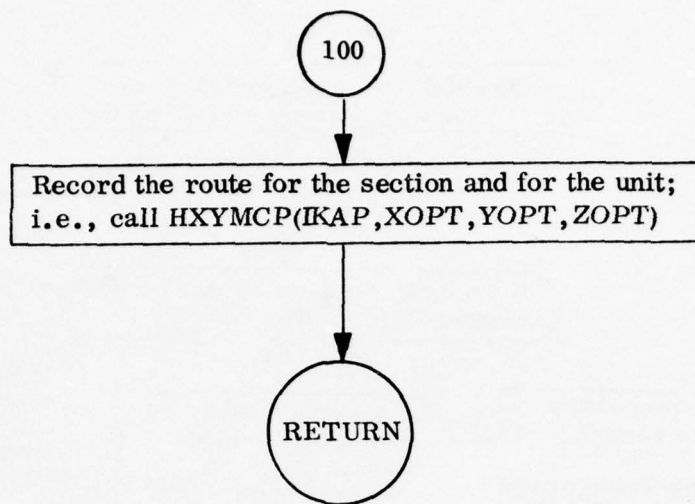
| | | |
|--------|--------|--------|
| HXYMCP | RTJOIN | RTSELH |
| RTATAK | RTLOIT | RTSRCH |
| RTCROS | RTSECT | |

PICKRT CALLED FROM: HELCON

LENGTH: 606₁₆ = 1542₁₀ bytes



Subroutine PICKRT: Route Selection for Aerial Sections
B-615



Subroutine PICKRT: Continued

Subroutine PRMSET

PURPOSE: Subroutine PRMSET sets new mission data for an aerial maneuver unit that has made a movement decision for any reason other than to accept a new mission from the fire support coordinator or a forward observer.

CALLING SEQUENCE:

CALL PRMSET(KDEC, NF)

where

KDEC = { decision flag for aerial unit
1 if unit has decided to retire
2 if unit has decided to seek a defensive position
3 if unit has decided to commence a countermeasure mission
4 if unit has decided to stand by for reassignment
5 if unit has decided to move the position of its MISTIC indirect-fire support loiter station

NF = fire support firer number corresponding to the aerial maneuver unit number being processed.

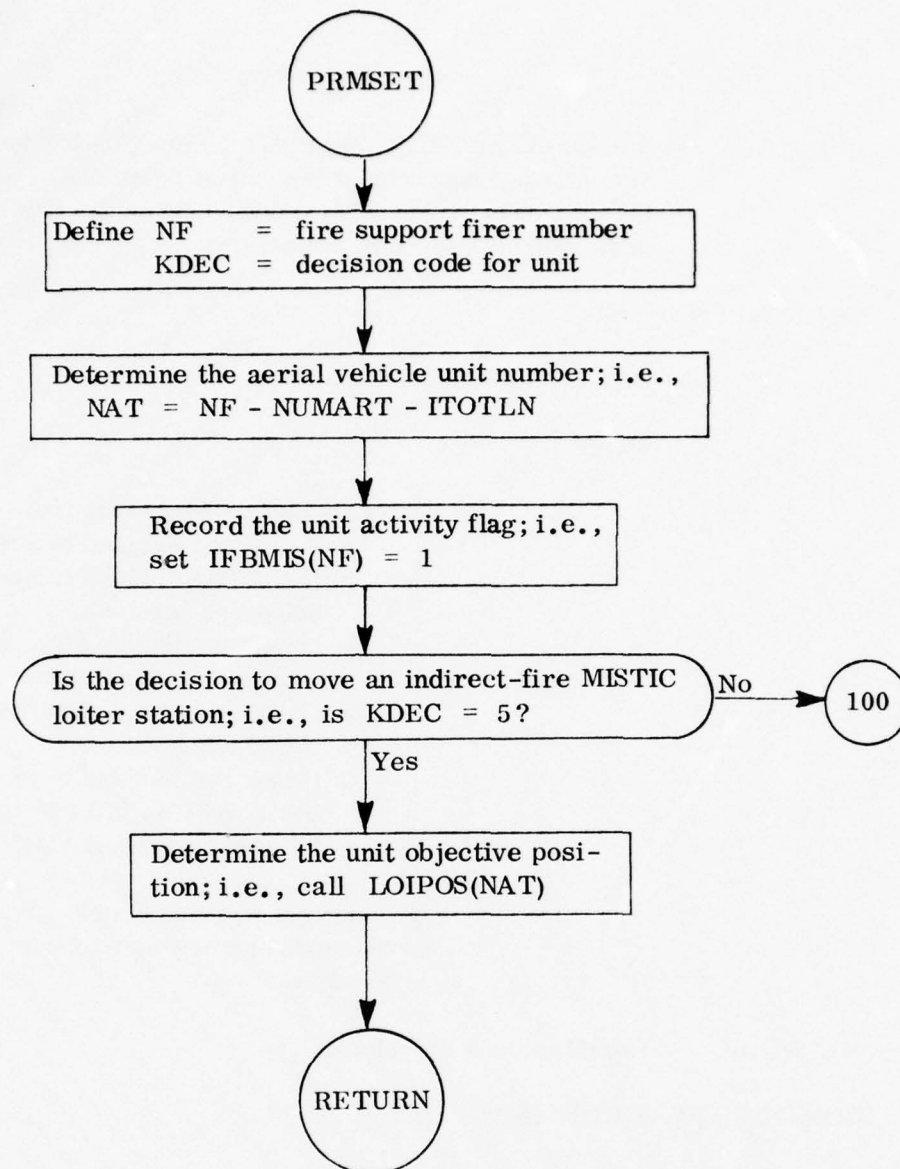
METHOD: See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

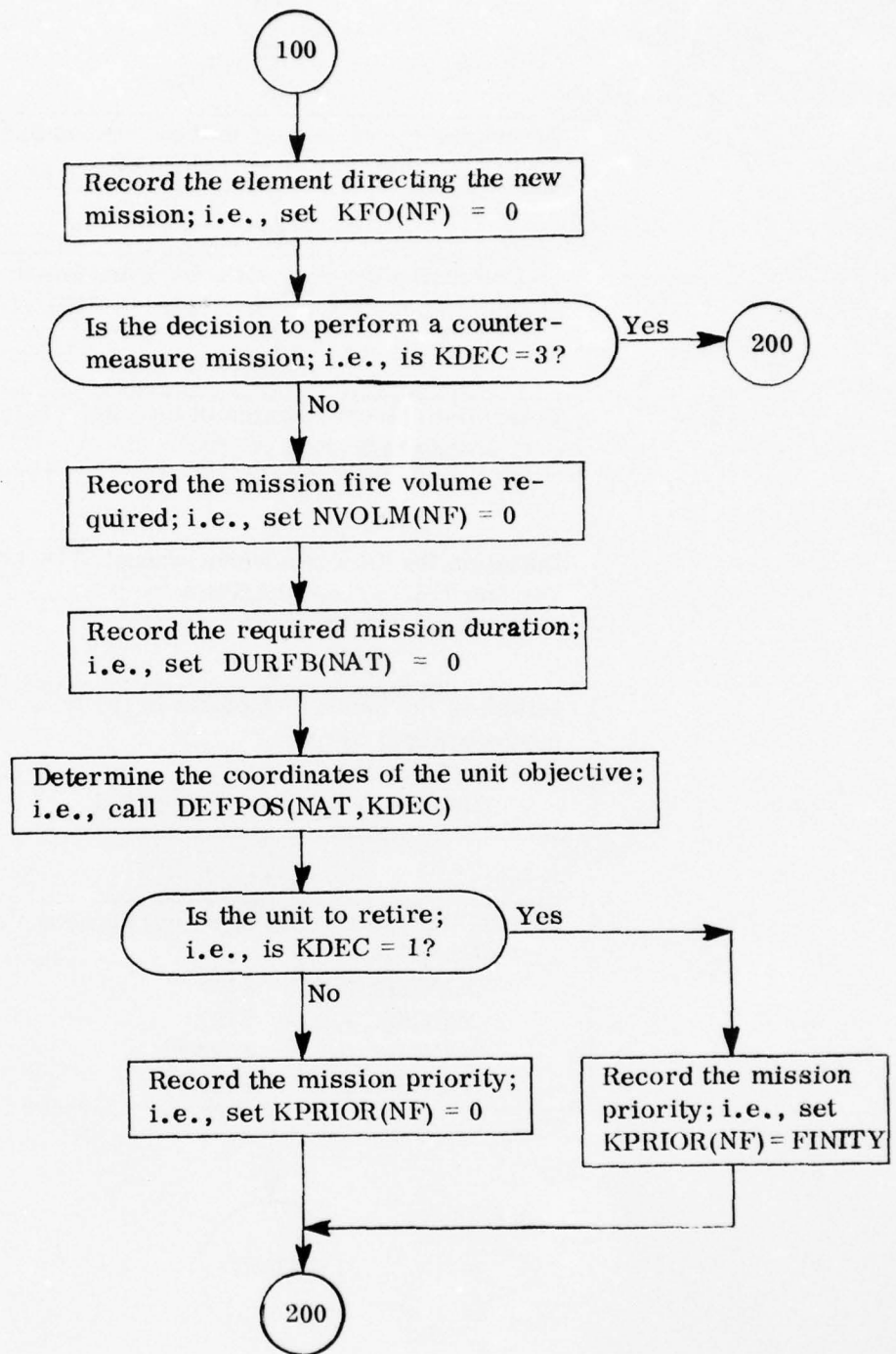
| | | |
|--------|--------|-------|
| DURFB | MANLDR | XAXIS |
| IFBMIS | NAXIS | XD |
| KFO | NPTS | YAXIS |
| KMANU | NUMBER | YD |
| KPRIOR | NVOLM | |

SUBROUTINES REQUIRED:

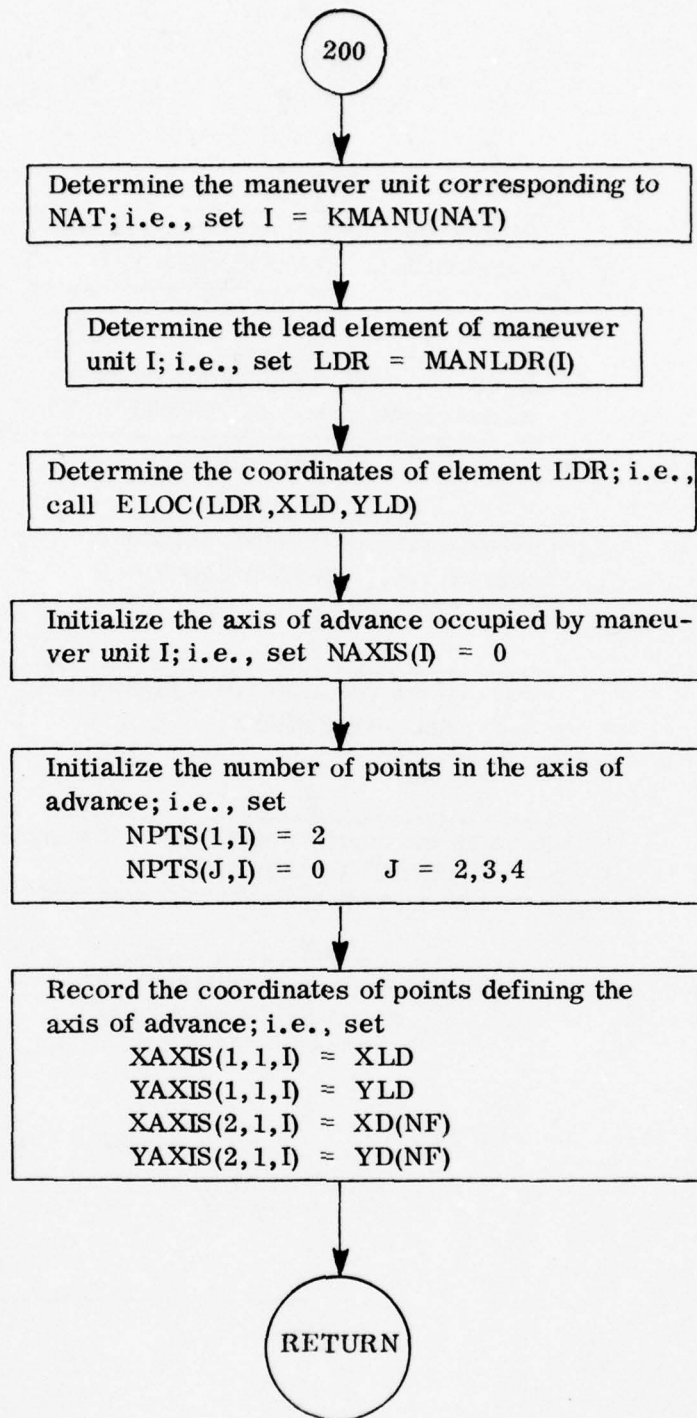
| | |
|--------|------|
| LOIPOS | ELOC |
| DEFPOS | |



Subroutine PRMSET: Determining Fire Support Firer Parameters
for an Aerial Unit



Subroutine PRMSET: Continued



Subroutine PRMSET: Continued

Subroutine REASFO

PURPOSE: Subroutine REASFO is used to reassign an artillery forward observer to a different artillery unit when the artillery unit/ fire direction center to which the FO was assigned has been totally disabled.

CALLING SEQUENCE:

CALL REASFO(KOLOR, NETOLD, NEWNET)

where

KOLOR = indicates to which force the FO belongs
(0 - blue, 1 - red)

NETOLD = net on which the FO is assigned

NEWNET = net on which the FO is to be reassigned
(NEWNET = 0 is returned if no artillery units remain)

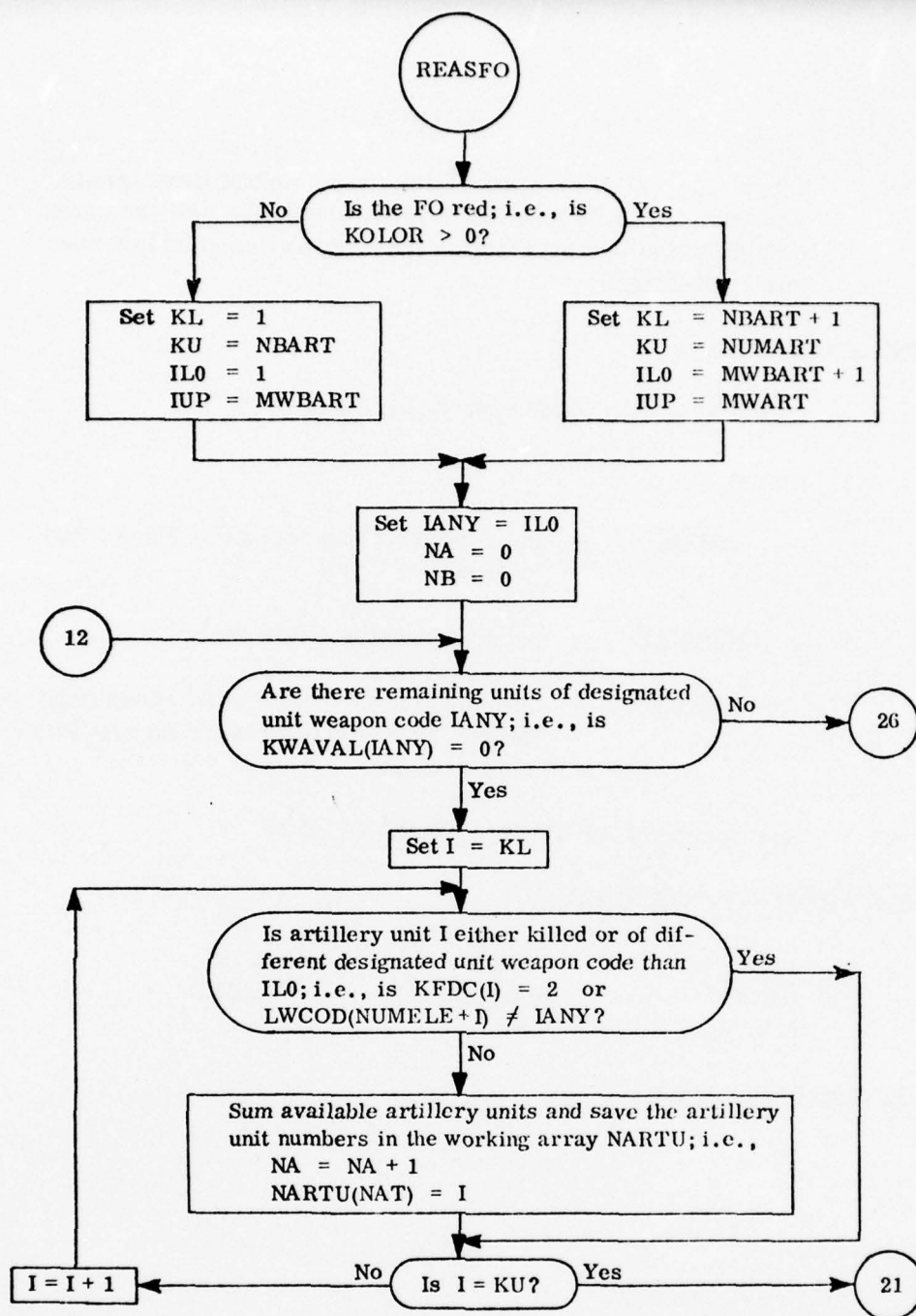
METHOD: See Chapter 2 of RF 2978 FR 71-3A (U).

COMMON AREAS REFERENCED:

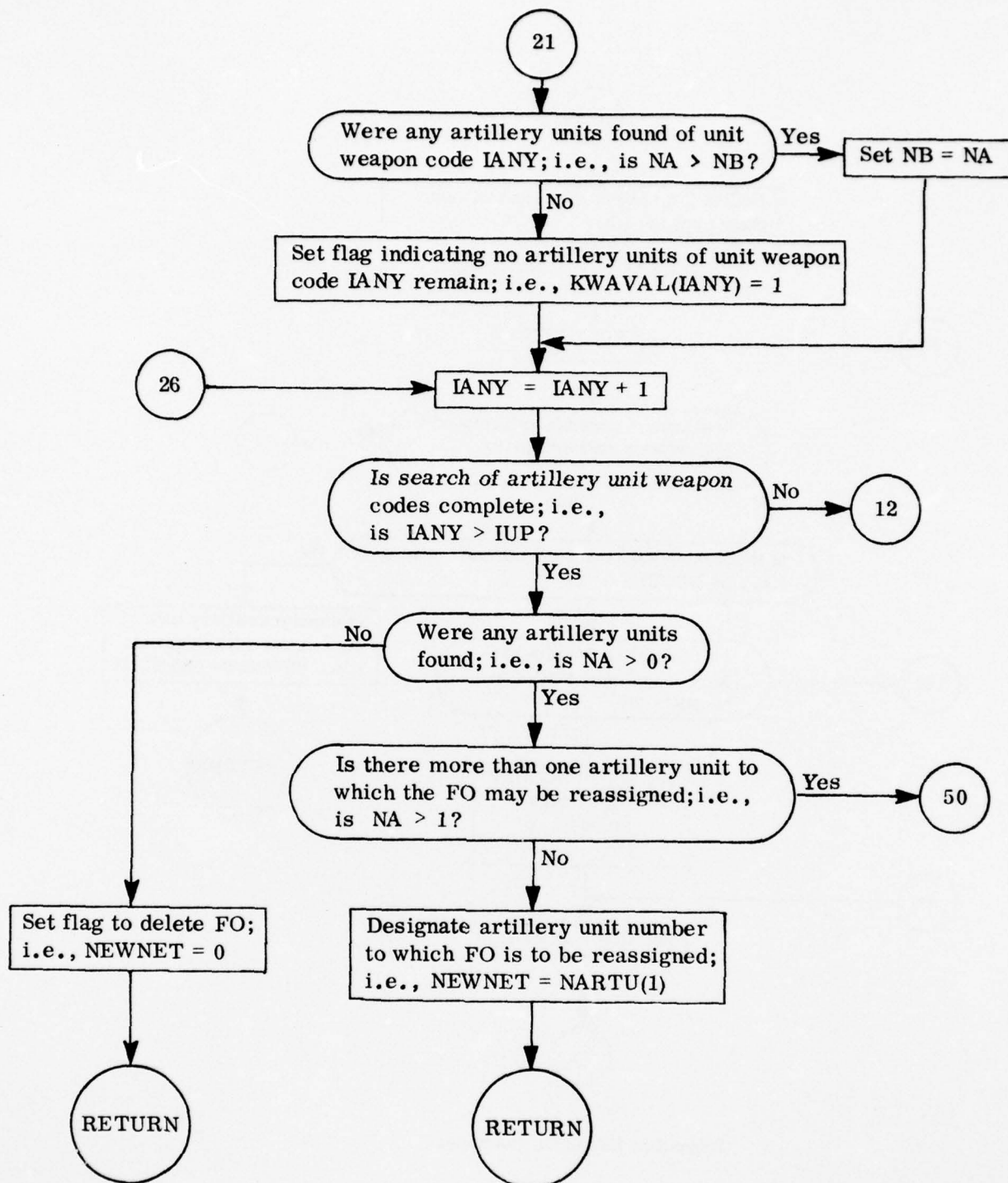
| | | |
|--------|-------|--------|
| INART | LKILL | NOBVH |
| KFDC | LWCOD | NUMBER |
| KWAVAL | NFR | |

SUBROUTINES REQUIRED:

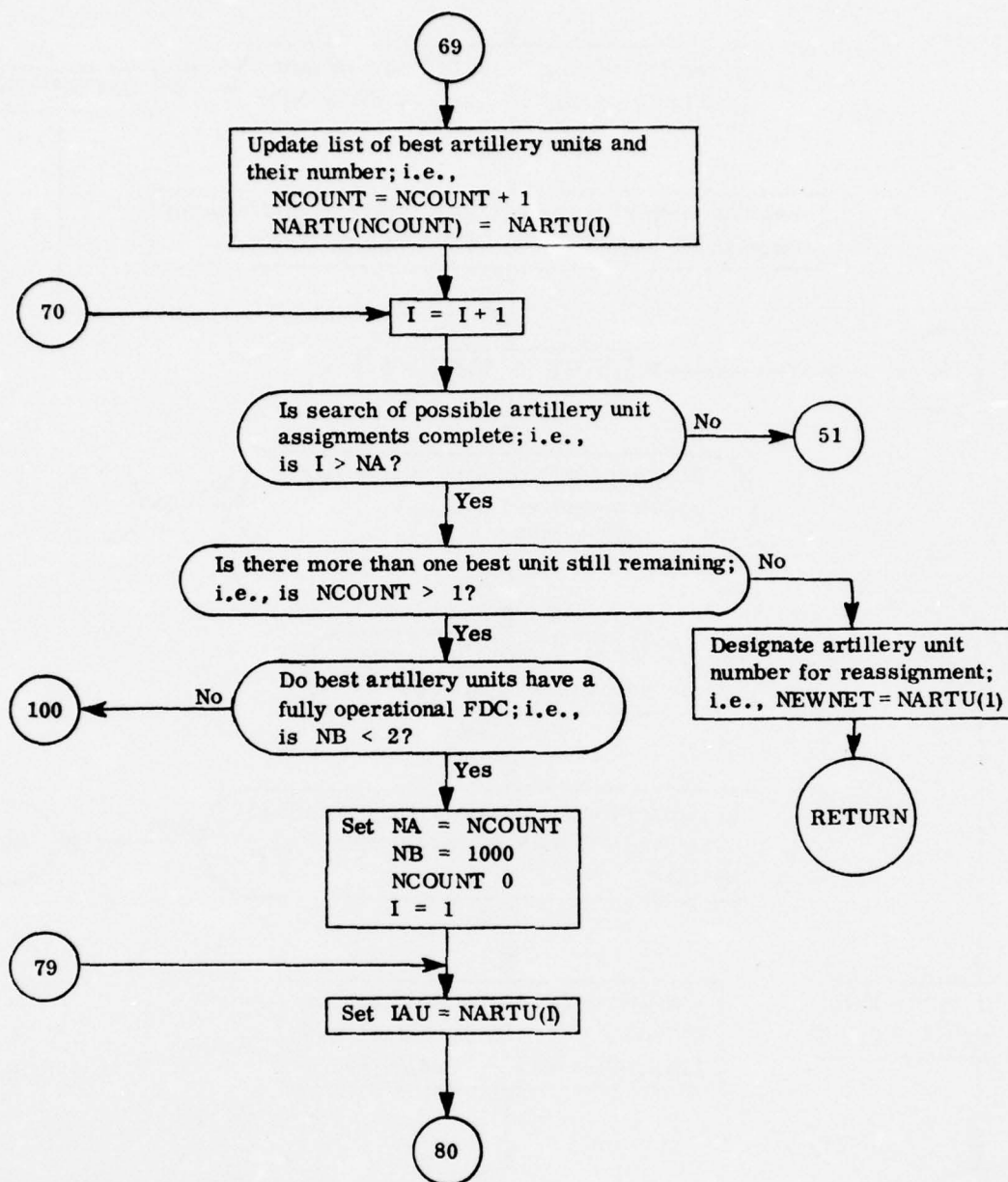
None



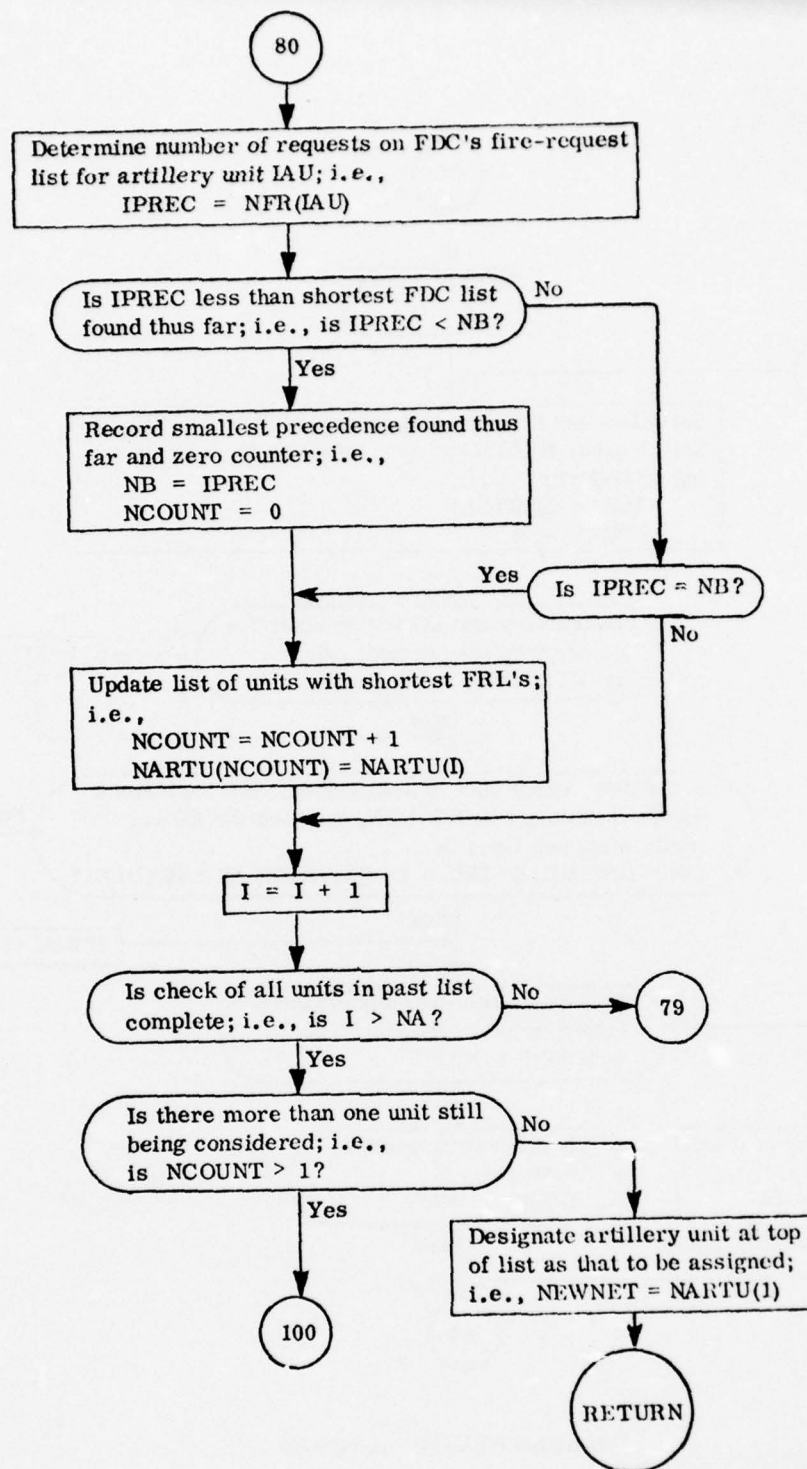
Subroutine REASFO: Reassigning Forward Observers to Noncasualty Artillery Units



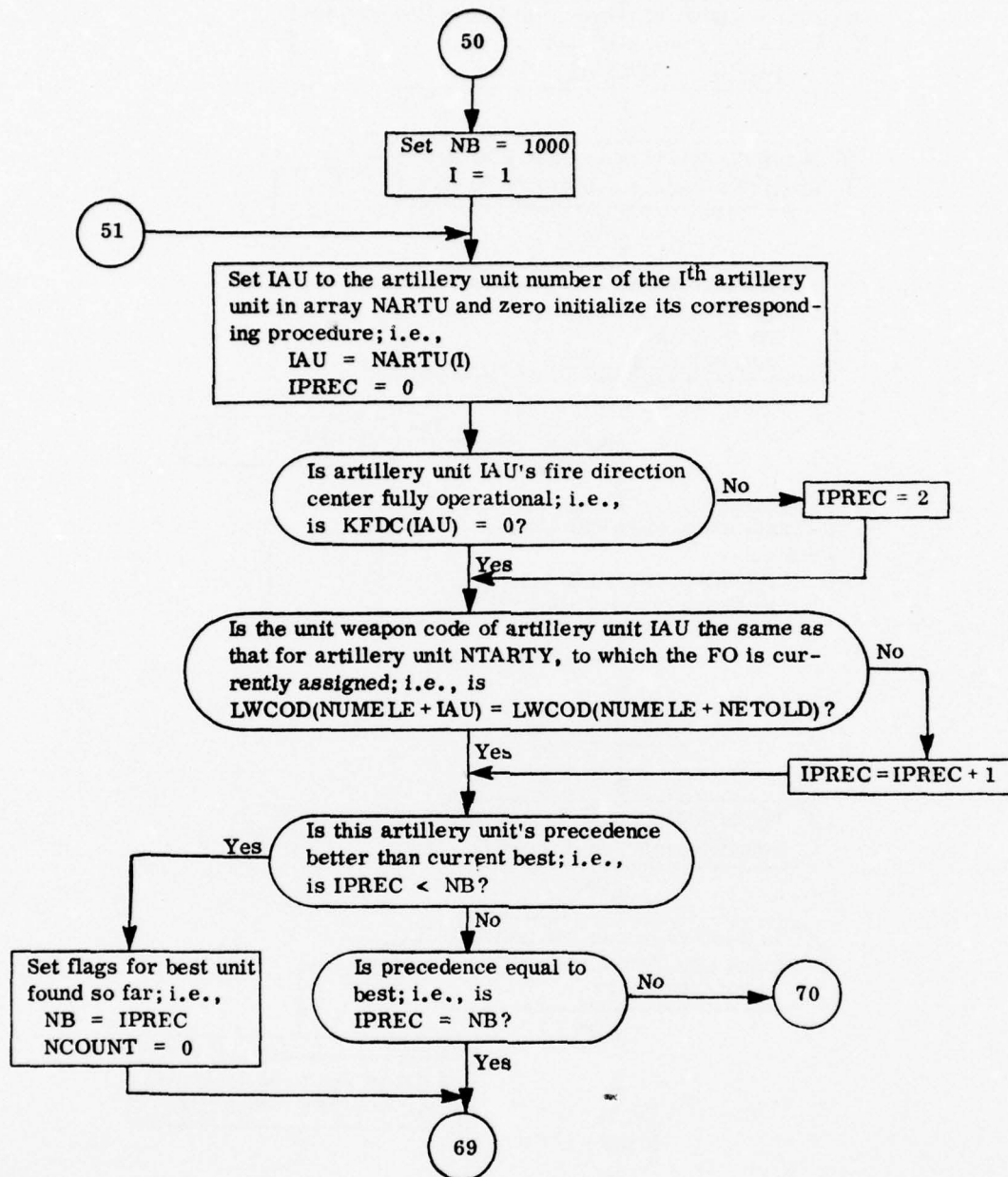
Subroutine REASFO: Continued



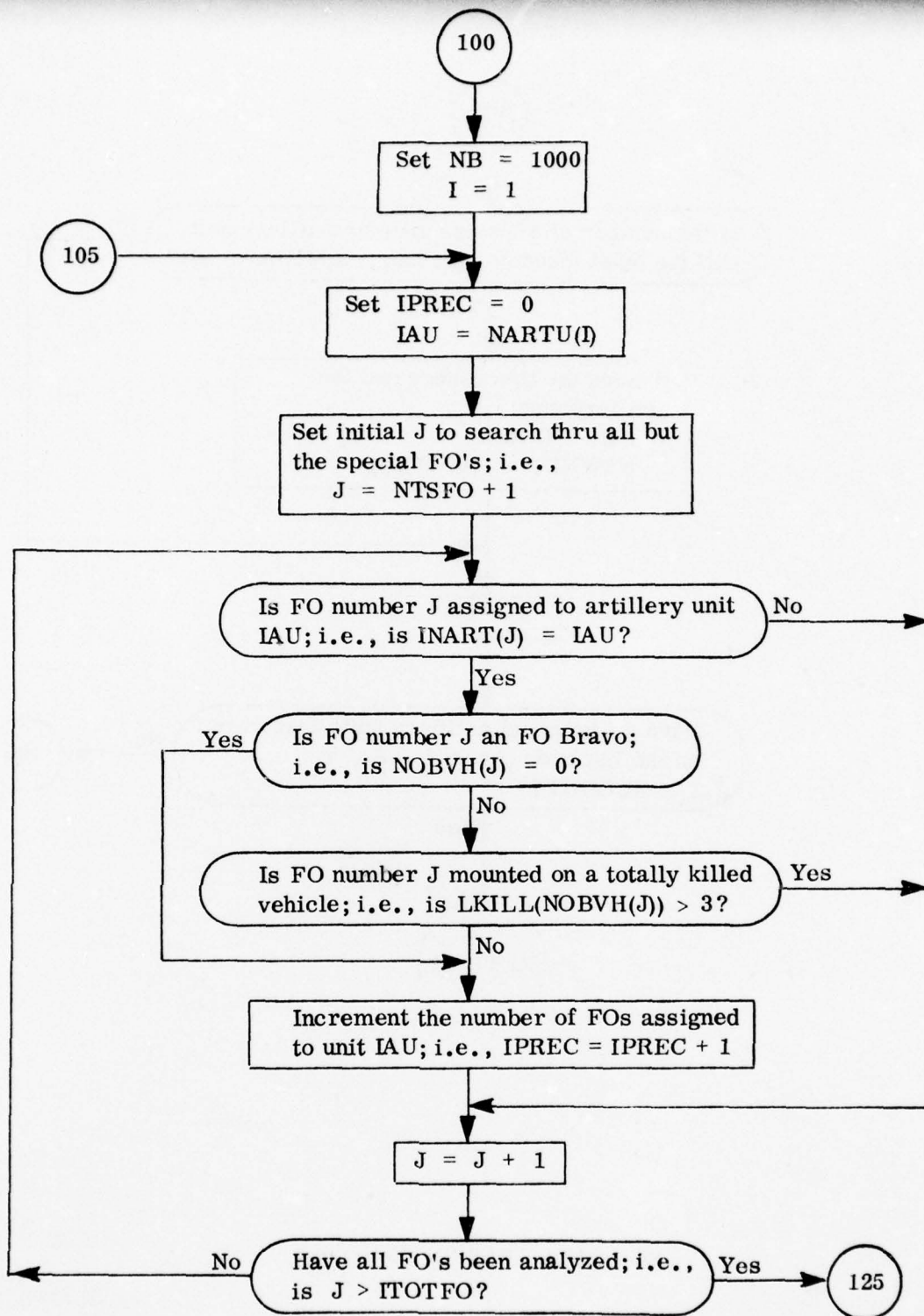
Subroutine REASFO: Continued



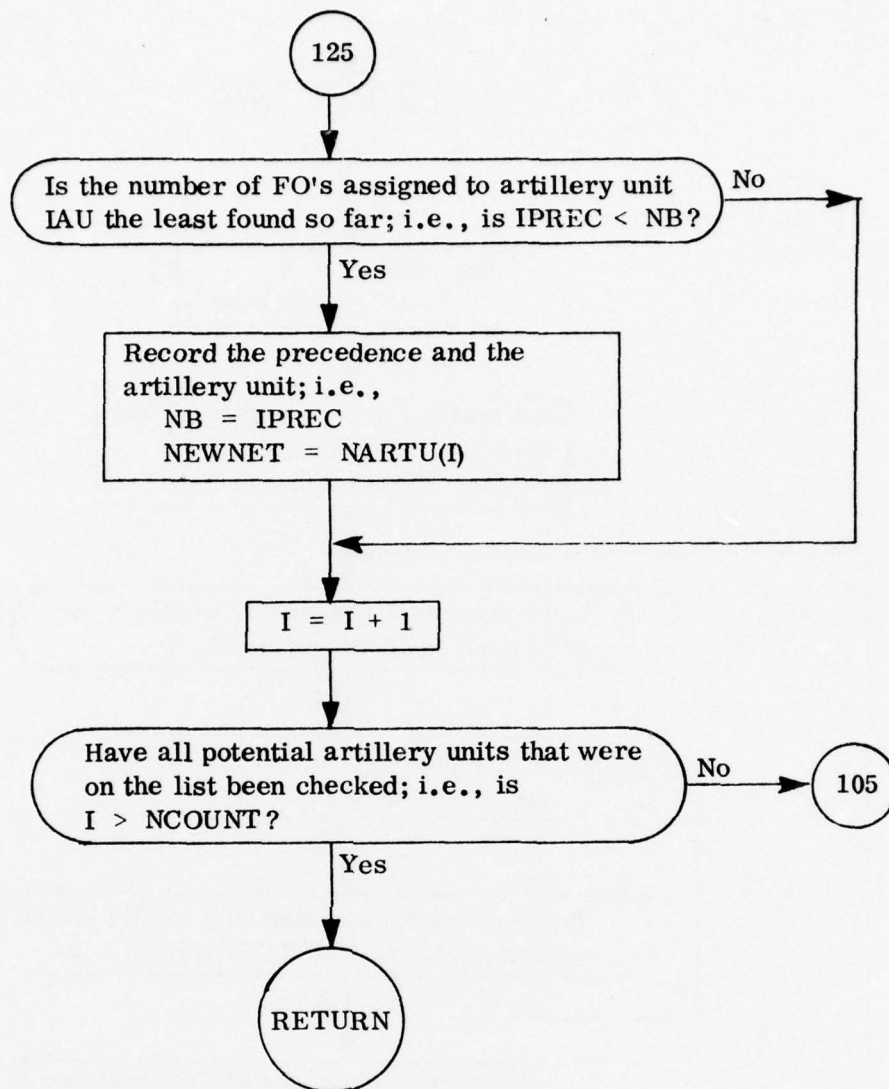
Subroutine REASFO: Continued



Subroutine REASFO: Continued



Subroutine REASFO: Continued



Subroutine REASFO: Continued

Subroutine RETIRE

PURPOSE: Subroutine RETIRE determines whether the aerial vehicle section to which the current element belongs should retire from the battlefield.

CALLING SEQUENCE:

CALL RETIRE (IRET)

IRET is returned with value 0 if the section is not to retire. A returned IRET value greater than zero indicates retirement as shown:

1. the fuel supply is below critical level,
2. the number of surviving elements is below critical level, or
3. all elements have zero ammunition remaining.

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| CFUEL | LWCOD | NUMBER |
| ICECOM | NAVSEC | WFUEL |
| ISORG | NREQR | |

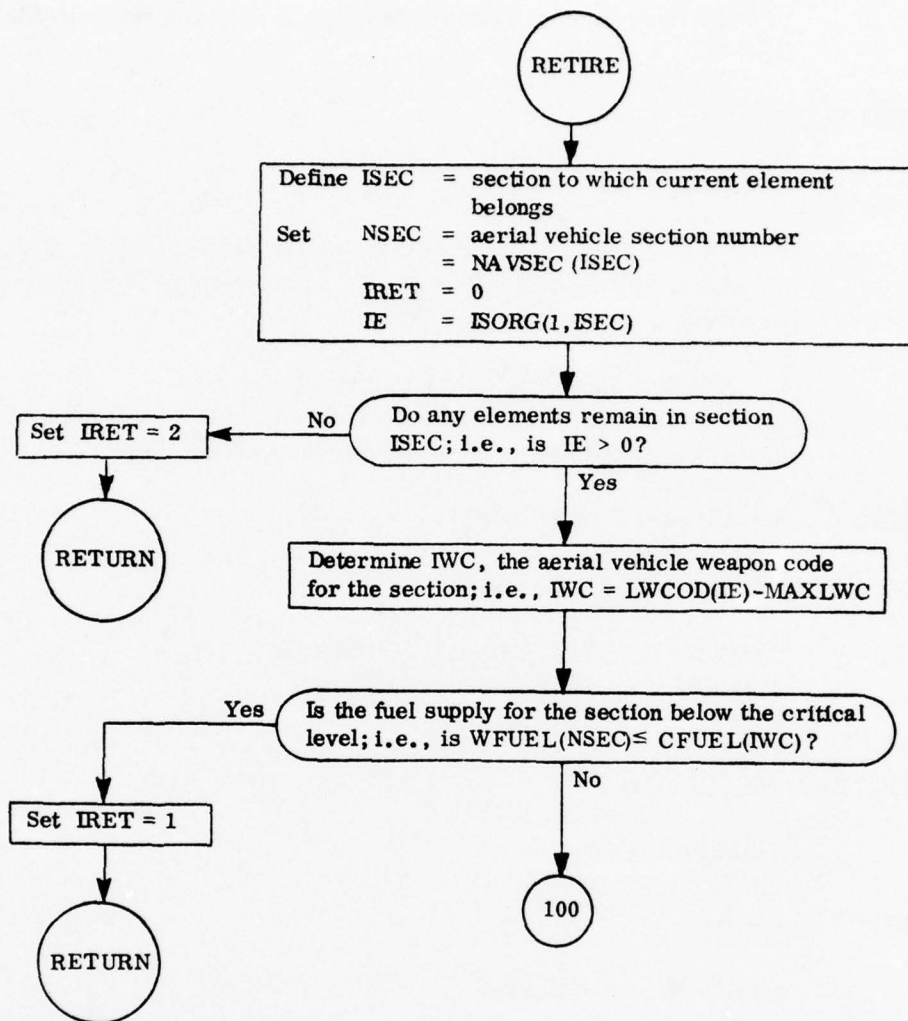
SUBROUTINES REQUIRED:

AMMO

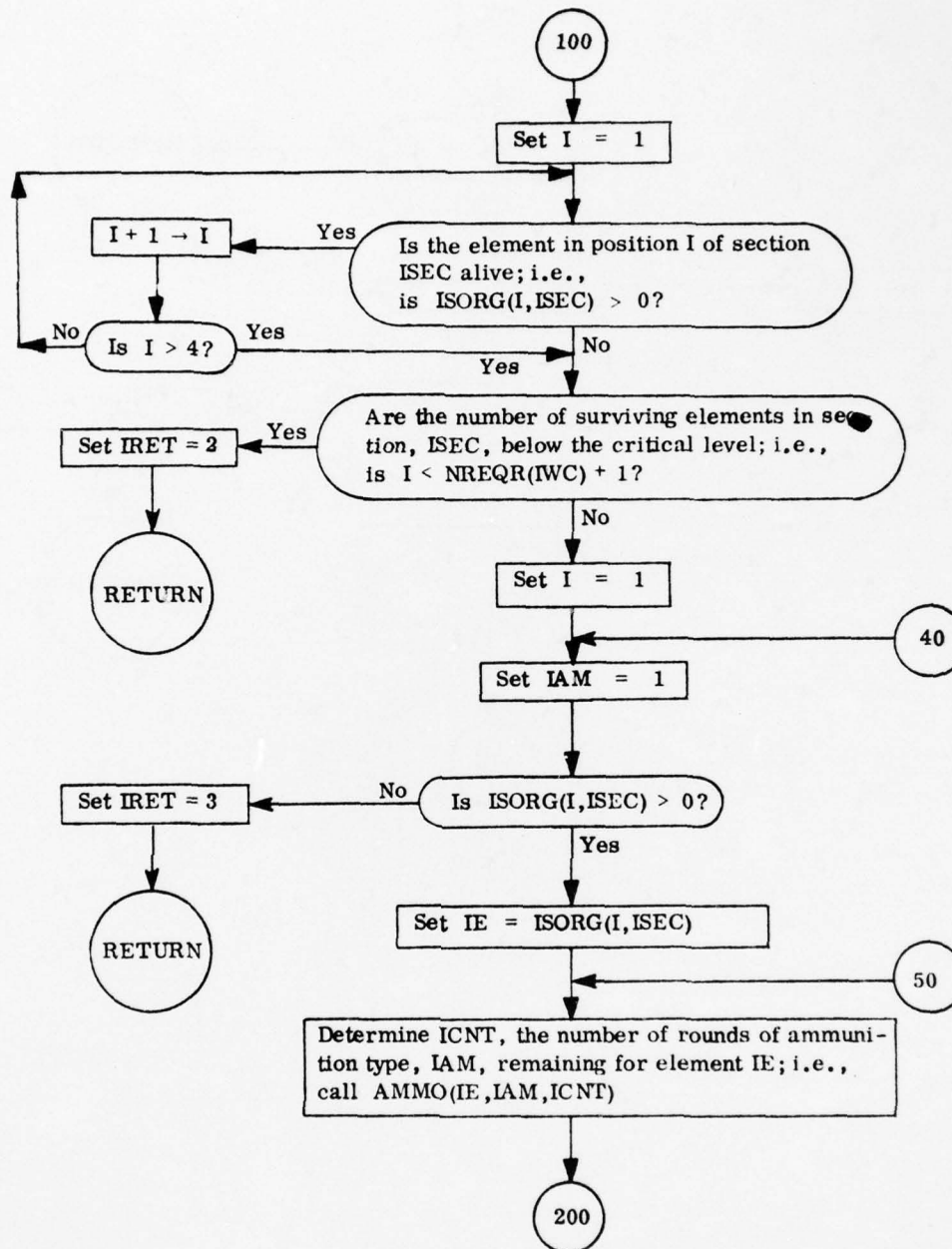
RETIRE CALLED BY:

ATKPRM HELCON

LENGTH: $45C_{16} = 1116_{10}$ bytes



Subroutine RETIRE: Retirement Decisions



Subroutine RETIRE: Continued

AD-A040 054

OHIO STATE UNIV COLUMBUS SYSTEMS RESEARCH GROUP
EXTENSION TO THE LAND COMBAT MODEL (DYNCOM). VOLUME 2, SECTION --ETC(U)
DEC 71 G M CLARK, R J WILHELM
RF-2995-FR 71-2(U)-SEC-2

F/G 15/7

DAAH01-70-C-0713

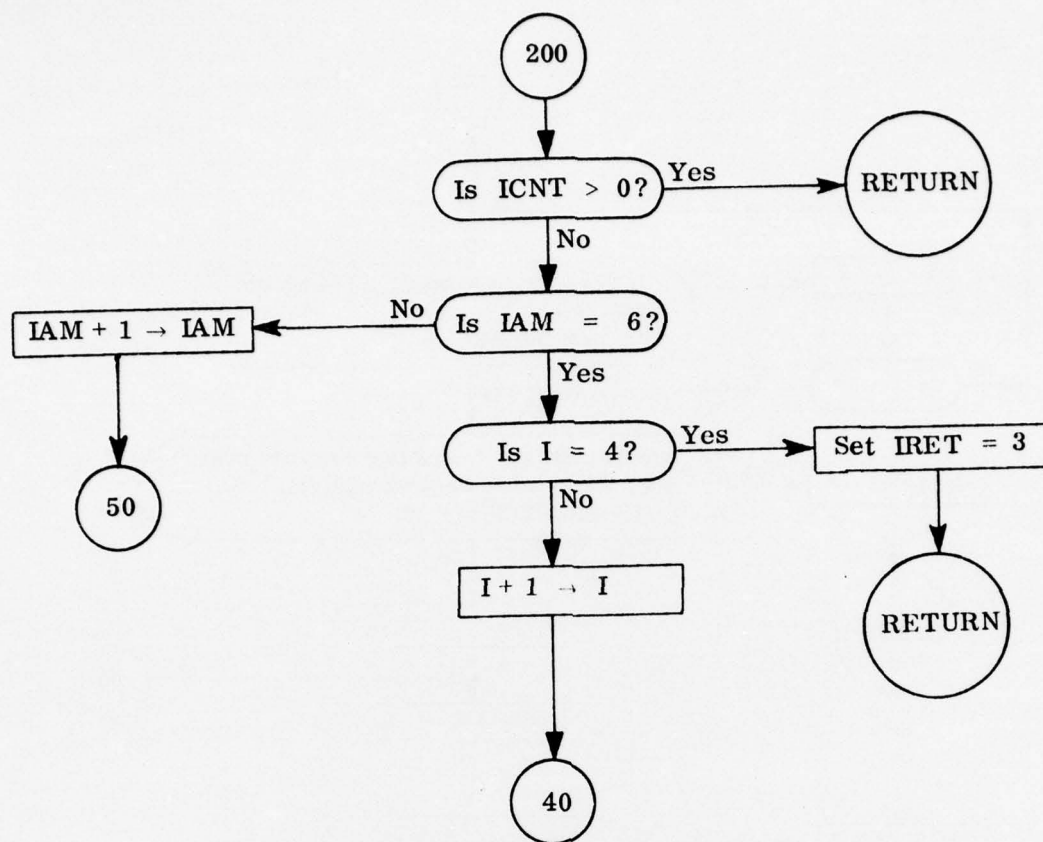
NL

UNCLASSIFIED

5 OF 6
AD
A040 054







Subroutine RETIRE: Continued

Subroutine REVAL

PURPOSE: Subroutine REVAL is designed to modify target characteristic descriptors that change when the fire-support coordinator assigns a fire request to a unit having different weapon characteristics than those for which the original request was prepared.

CALLING SEQUENCE:

CALL REVAL (NC, KK, IONCAL, NFO, XC, YC, NET,
NTOMUF)

where

NC = $\left\{ \begin{array}{l} \text{concentration number, if the request} \\ \text{is for on-call fire} \\ 0 \text{ if otherwise (input)} \end{array} \right.$

KK = weapon code of the newly assigned unit
(input)

IONCAL = $\left\{ \begin{array}{l} 3 \text{ if fire request was triggered by} \\ \text{friendly element movement} \\ 4 \text{ if fire request was triggered by} \\ \text{enemy element movement} \\ 0 \text{ if otherwise (input)} \end{array} \right.$

NFO = number of the forward observer requesting
fire (input)

XC, YC = position coordinates of the target described
in the fire request (input)

NET = $\left\{ \begin{array}{l} \text{input as the number of the newly} \\ \text{assigned unit} \\ \text{output as input unless the new unit} \\ \text{weapon code is incapable of en-} \\ \text{gaging target, in which case a zero} \\ \text{is returned} \end{array} \right.$

NTOMUF = see subroutine FSCMON (input)

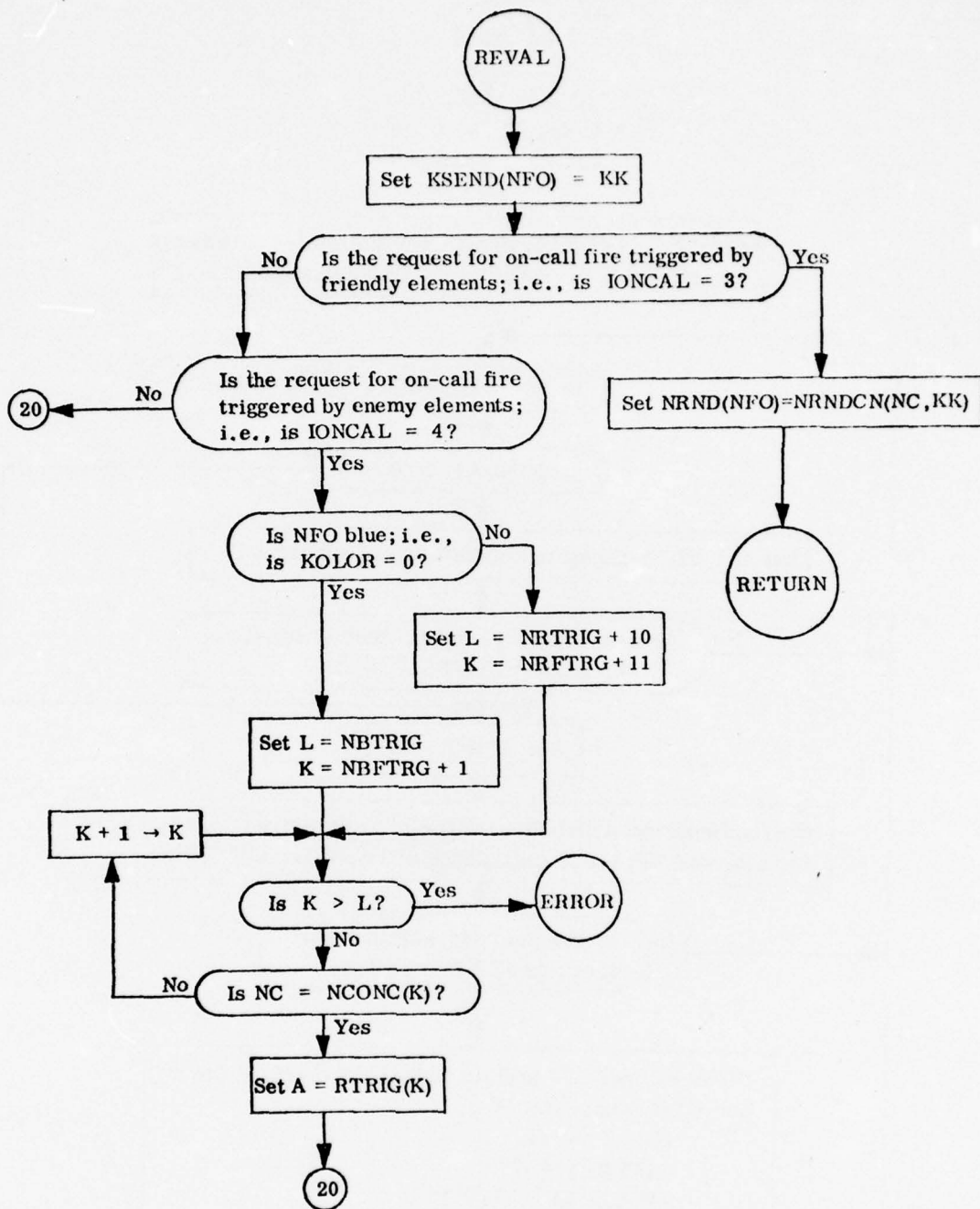
METHOD: See Chapter 4 of RF 2978 FR 71-3A (U).

COMMON AREAS REFERENCED:

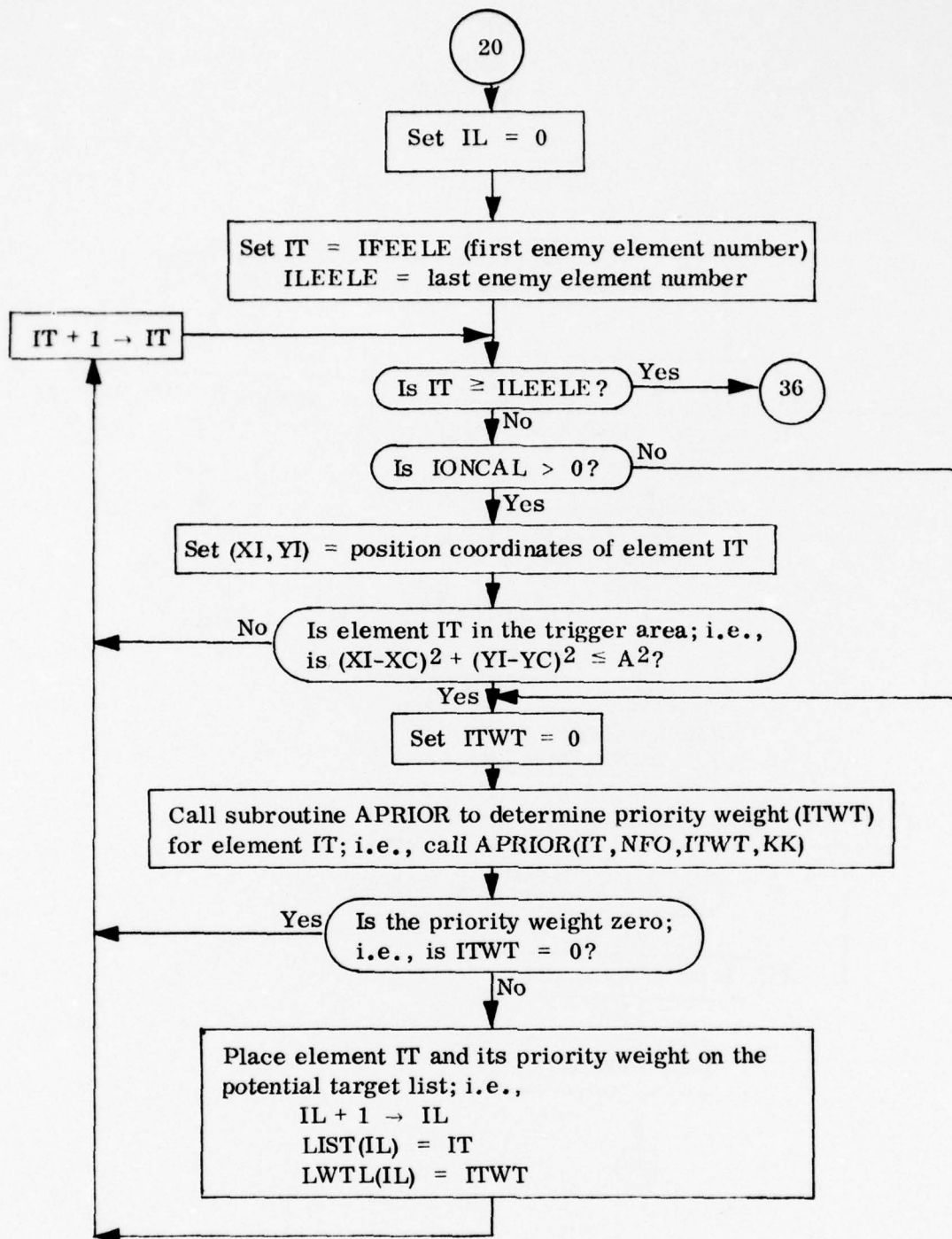
| | | | |
|--------|--------|--------|--------|
| INART | INTARG | LWCOD | MISFO |
| DURFO | INTRIG | LWSYS | ONDIST |
| DURSTL | IPRIOR | NCONC | ORESPN |
| EVBAR | IWEAP | NRND | RTRIG |
| FRN1 | JARMOR | NRNDCN | TINIT |
| FRN2 | KPATFO | NUMBER | XDFO |
| ICECOM | KSEND | NXMFO | YDFO |

SUBROUTINES REQUIRED:

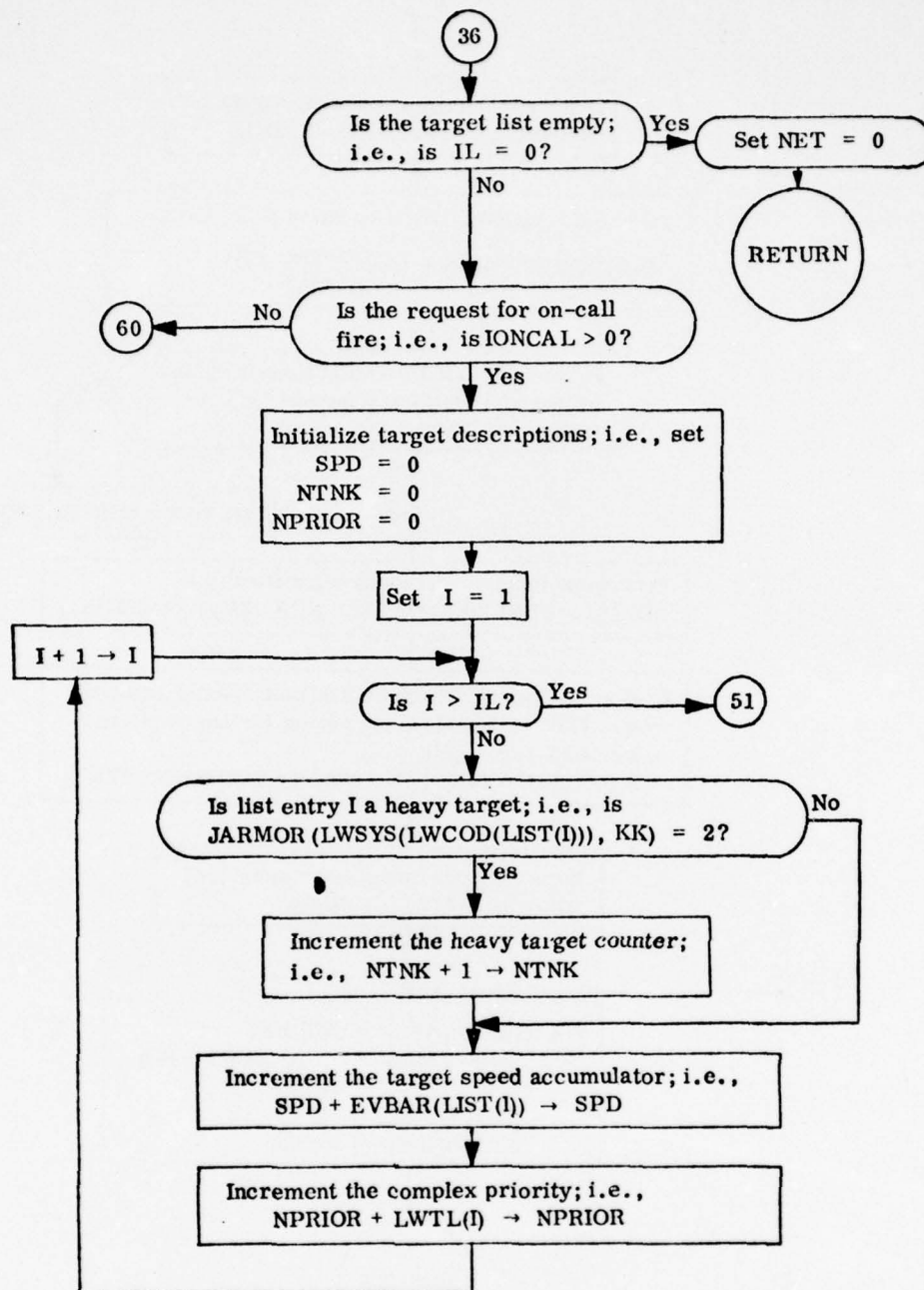
| | |
|--------|--------|
| APRIOR | WPRIOR |
| ELOC | SELECA |
| ERROR | |



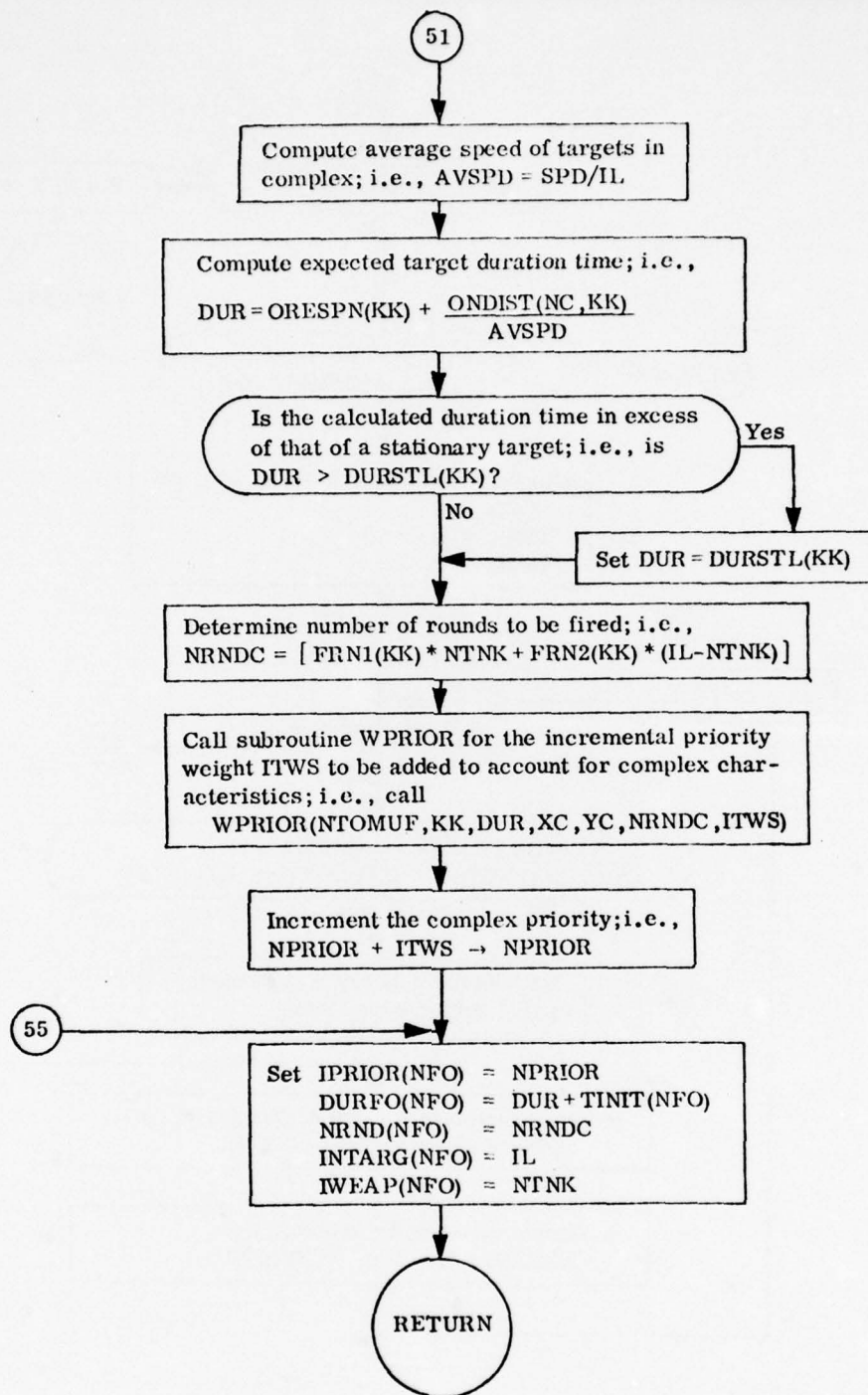
Subroutine REVAL: Reevaluation of FO Target



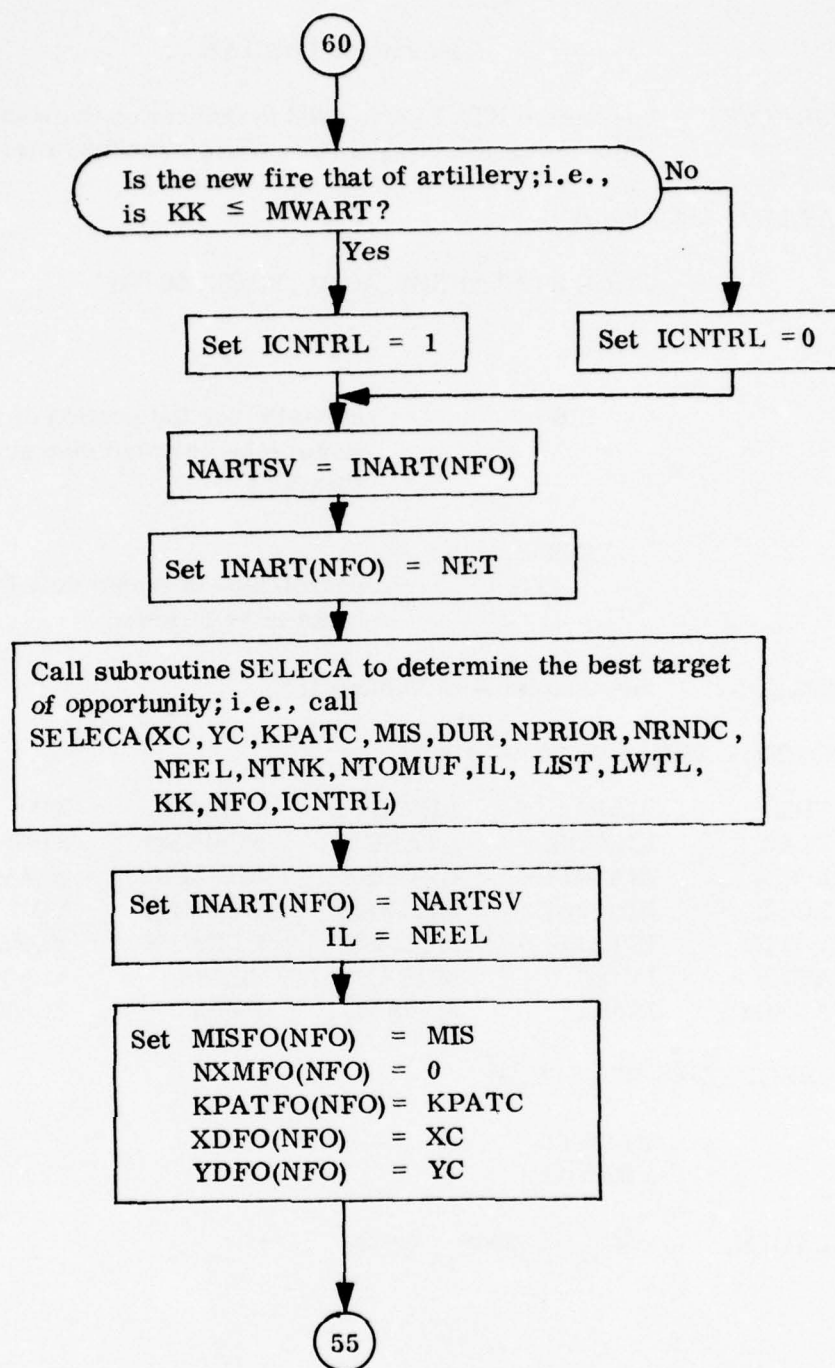
Subroutine REVAL: Continued



Subroutine REVAL: Continued



Subroutine REVAL: Continued



Subroutine REVAL: Continued

Subroutine RTATAK

PURPOSE: Subroutine RTATAK is used to determine the route to be followed by an aerial section while attacking a target.

CALLING SEQUENCE:

CALL RTATAK(IRS,XOPT,YOPT,ZOPT)

where

IRS = indicator for the portion of the attack route to be selected (see subroutine PICKRT)

XOPT,YOPT,
ZOPT = coordinates of points defining the route to be followed

METHOD: See Chapter 6 of Volume 1.

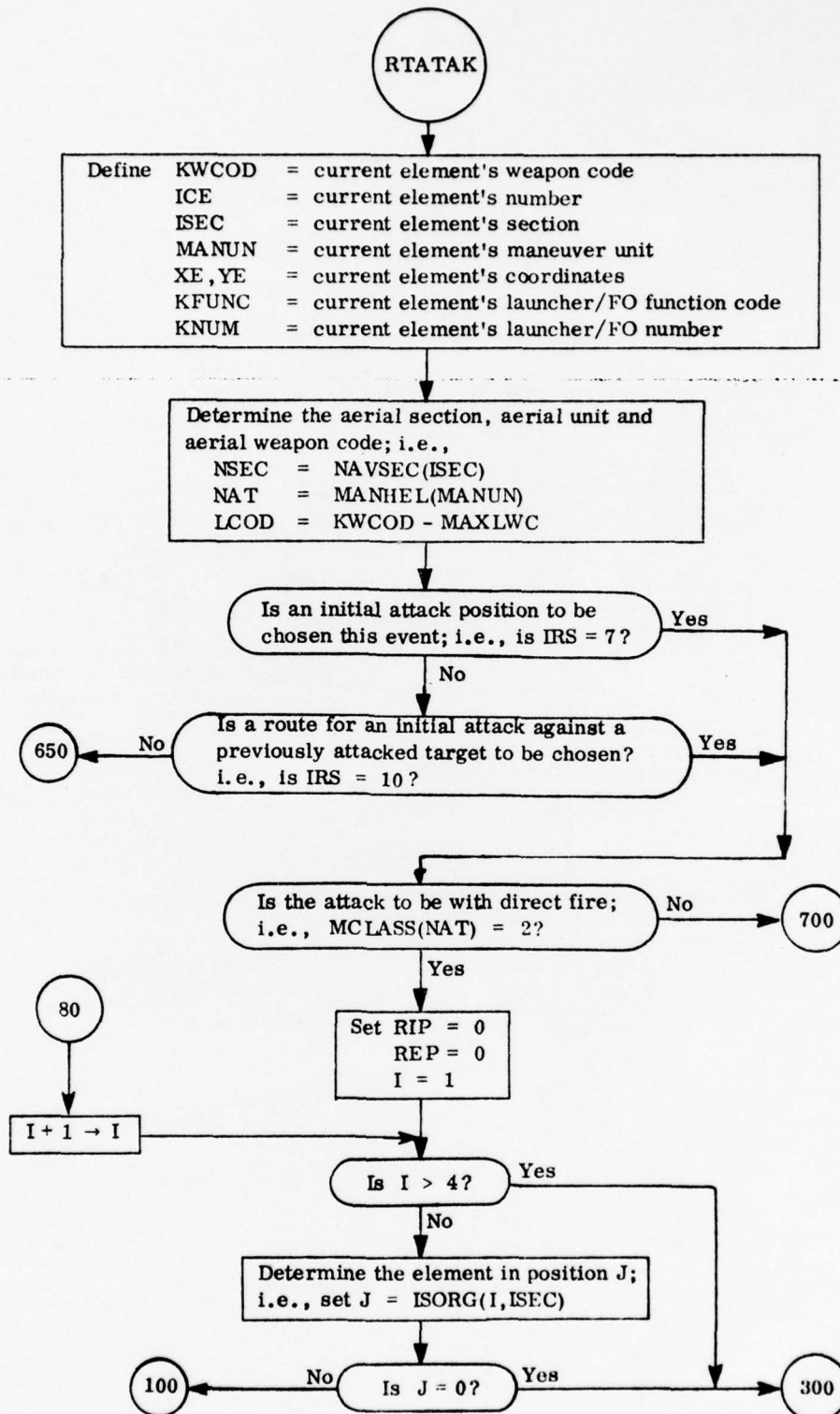
COMMON AREAS REFERENCED:

| | | | | |
|--------|--------|--------|--------|-------|
| ATDIR | ICAP | LHICE | NMISUN | XD |
| ATLIM | ICECOM | LTARS | NUMBER | XDFO |
| ELOCX | IHAMO | LWCOD | RDFMIN | XSAVE |
| ELOCY | IHDFMC | MANHEL | RFOMAX | YD |
| EVHTIM | IHTARG | MCLASS | RLNMAX | YDFO |
| FACTL | IMIST | MDFAF | SPDSE | YSAVE |
| HALTDS | ISORG | NAVSEC | TFLY | ZSAVE |

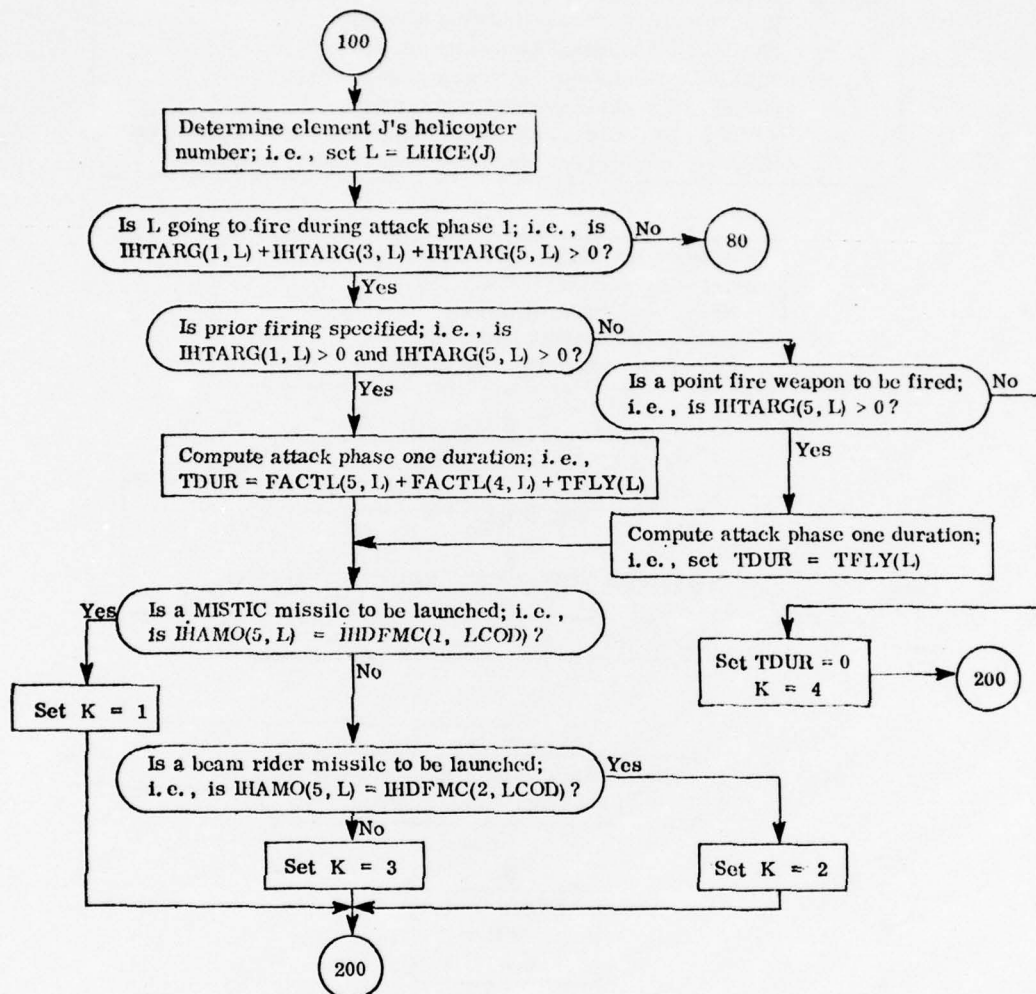
SUBROUTINES REQUIRED:

ELVATE
FRANUD

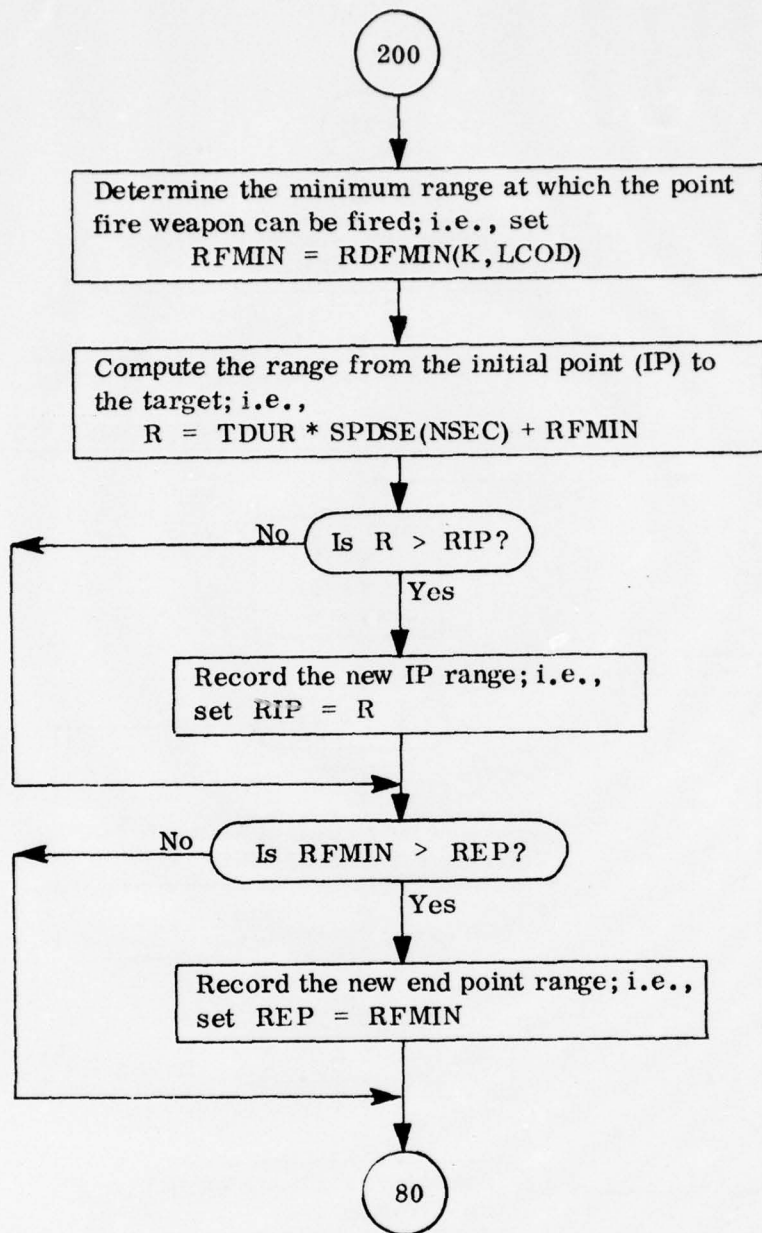
LENGTH: F6C₁₆ = 3948₁₀ bytes



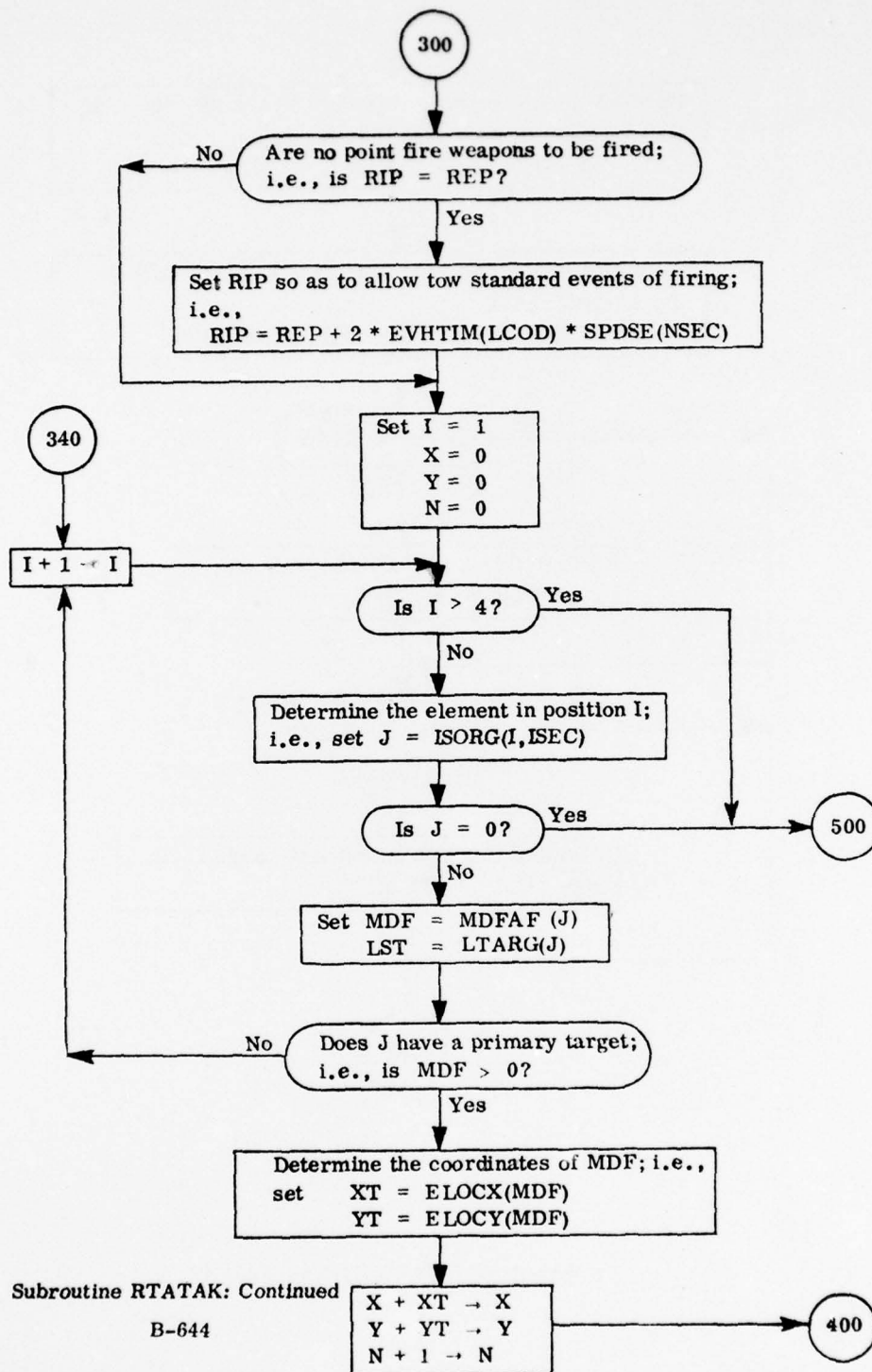
Subroutine RTATAK: Continued
B-641

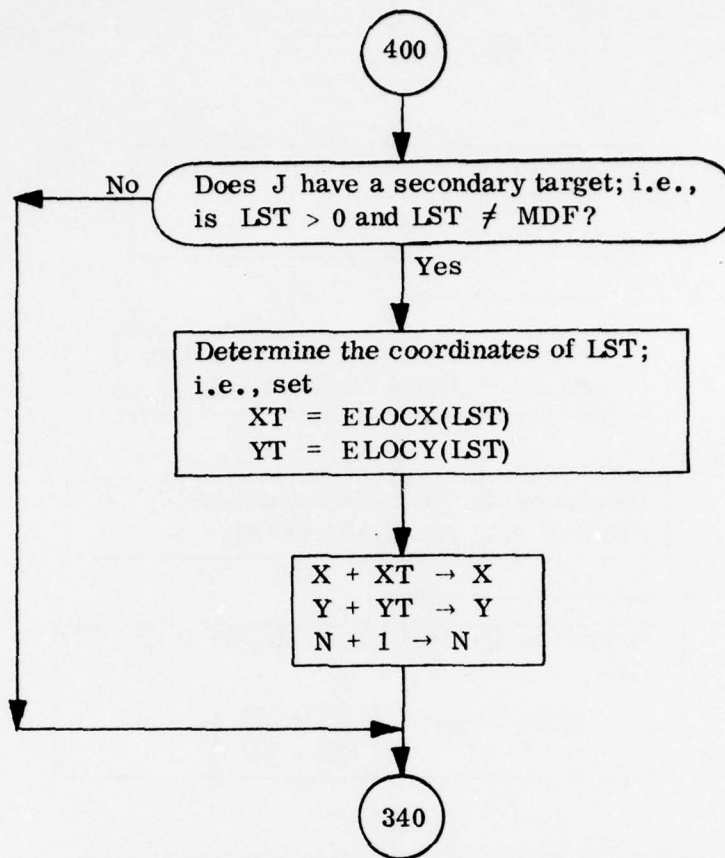


Subroutine RTATAK: Continued

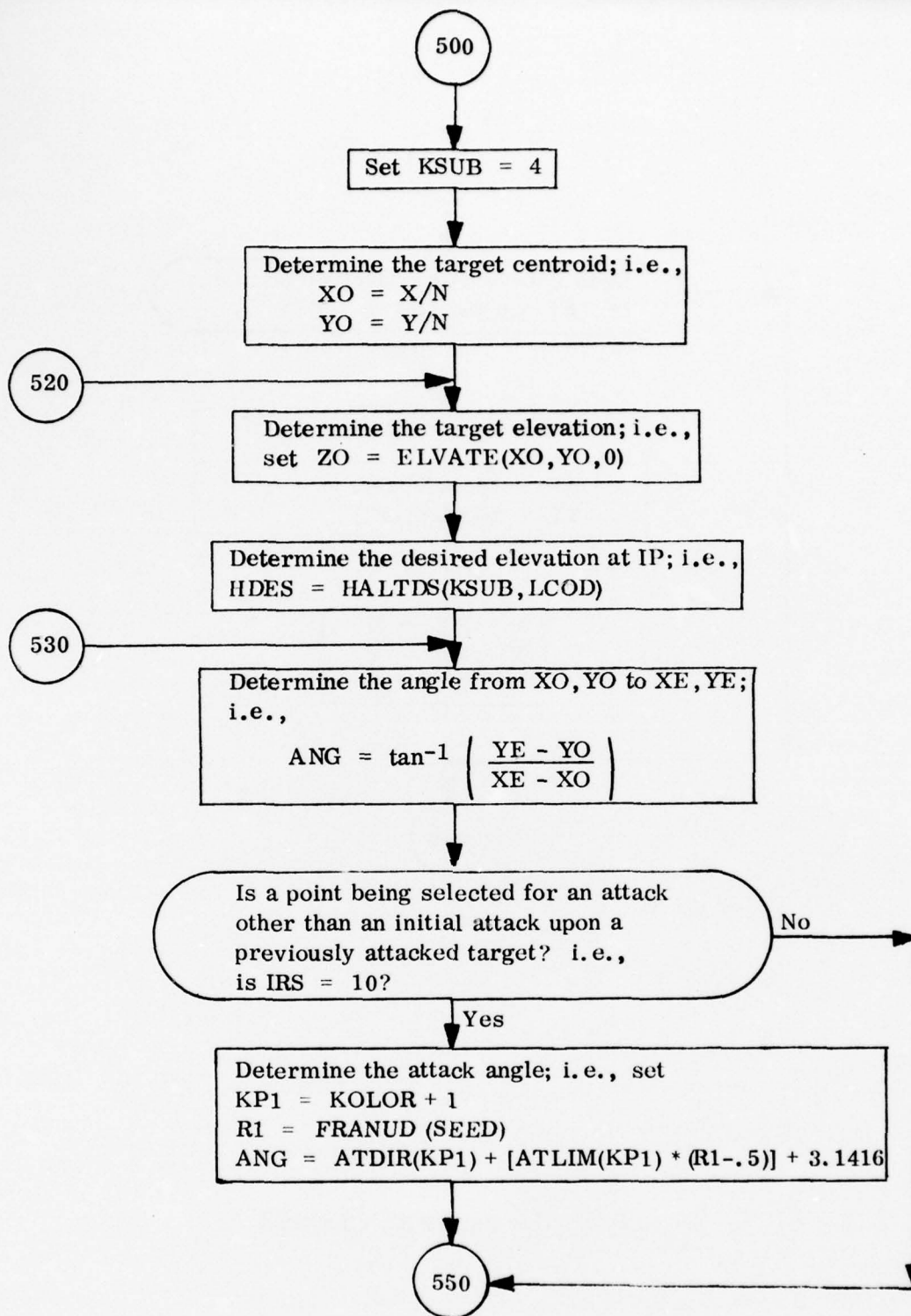


Subroutine RTATAK: Continued

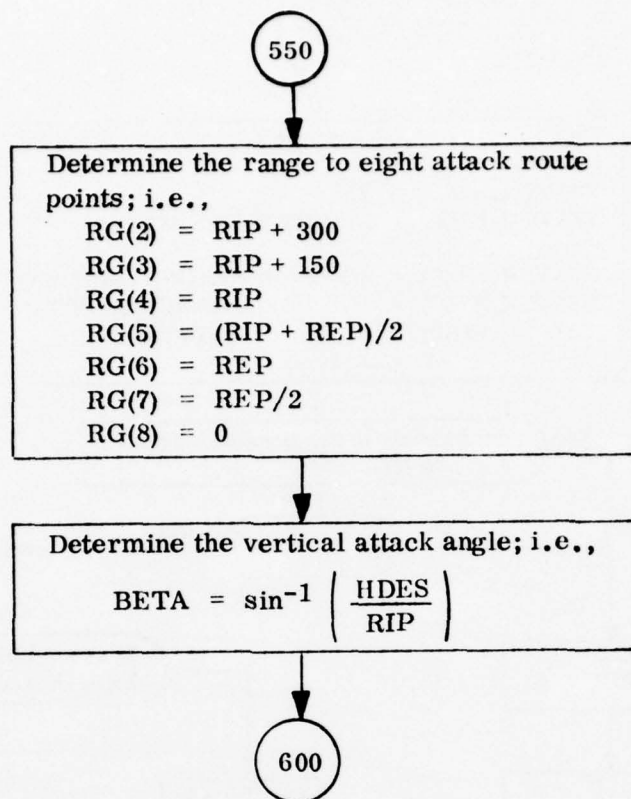




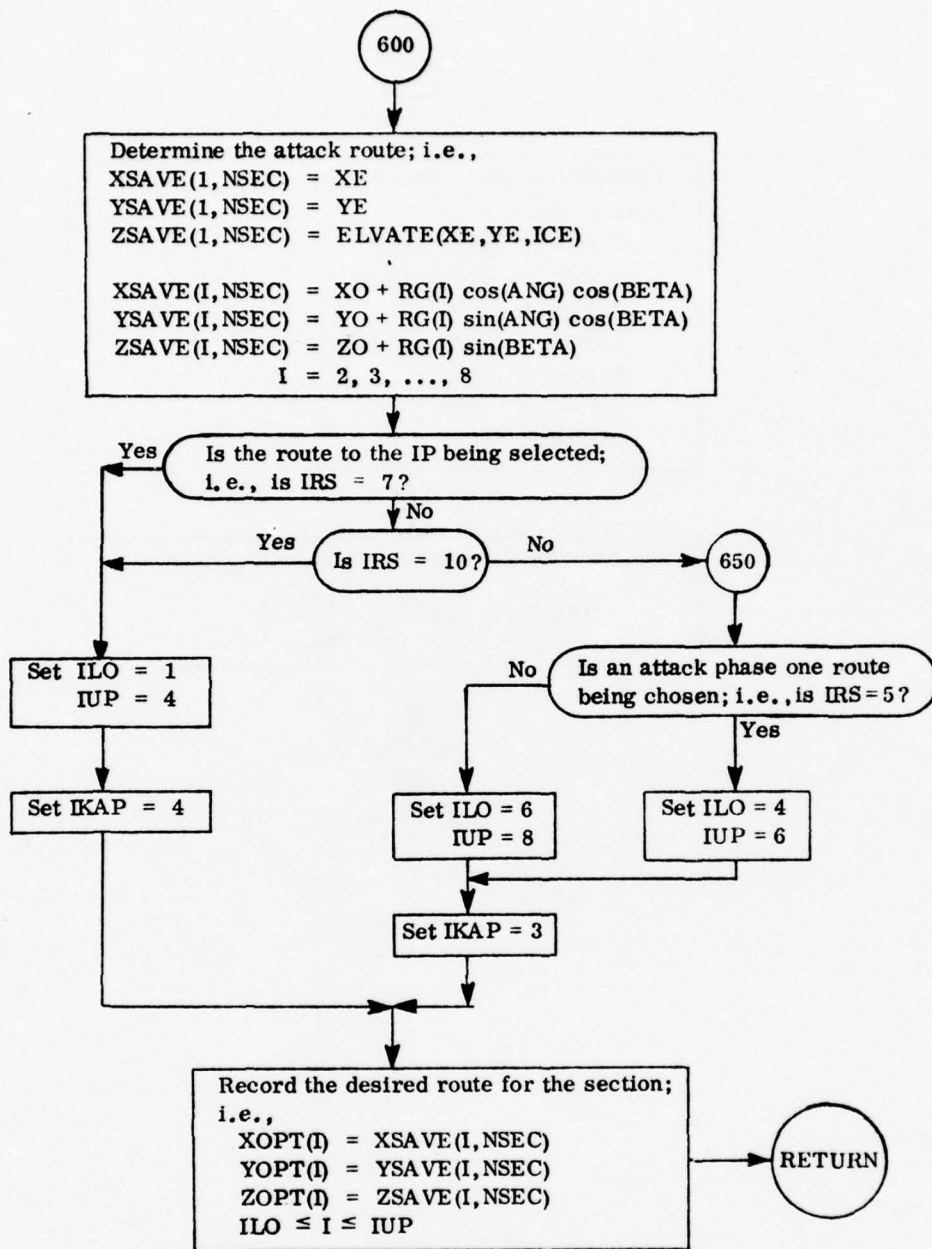
Subroutine RTATAK: Continued



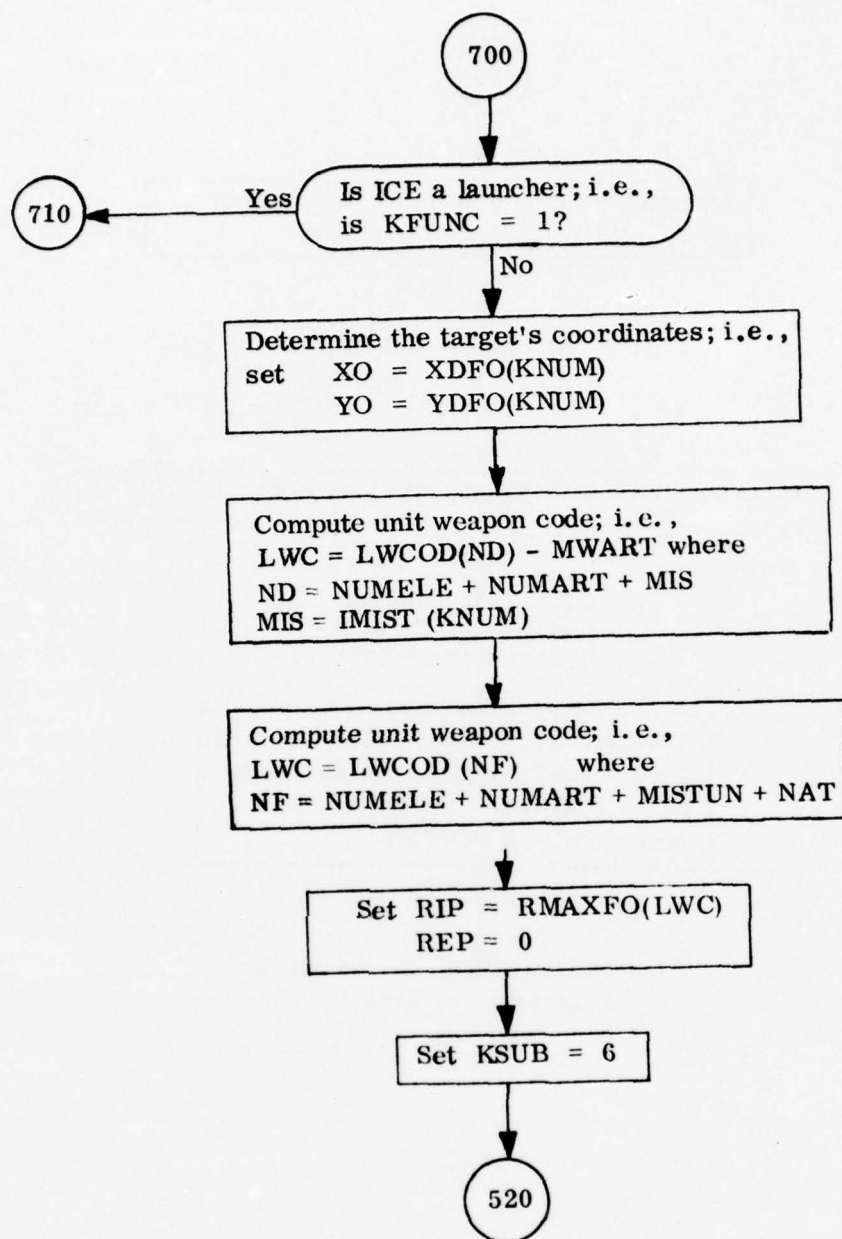
Subroutine RTATAK: Continued



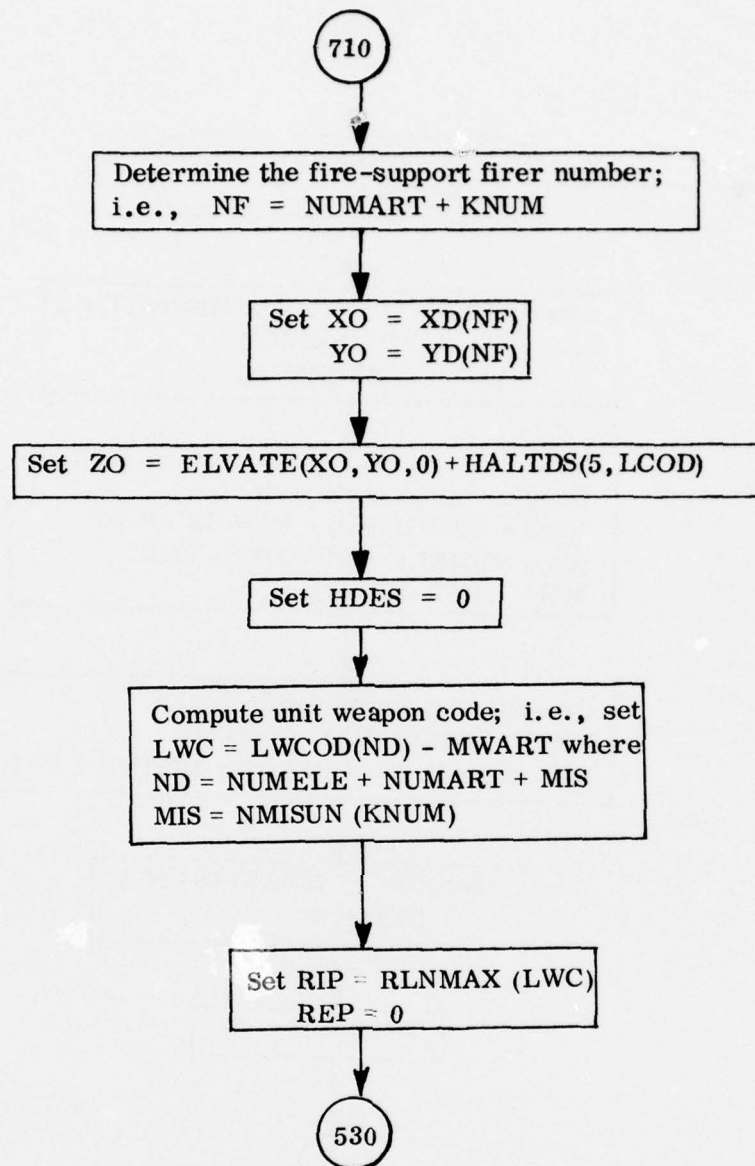
Subroutine RTATAK: Continued



Subroutine RTATAK: Continued



Subroutine RTATAK: Continued



Subroutine RTATAK: Continued

Subroutine RTCROS

PURPOSE: Subroutine RTCROS is used to define the axis of advance for an aerial section that is to perform enroute movement.

CALLING SEQUENCE:

CALL RTCROS(XA, YA, ZA)

where

XA, YA, ZA = arrays containing the battlefield X, Y,
and Z coordinates of the section's axis
of advance.

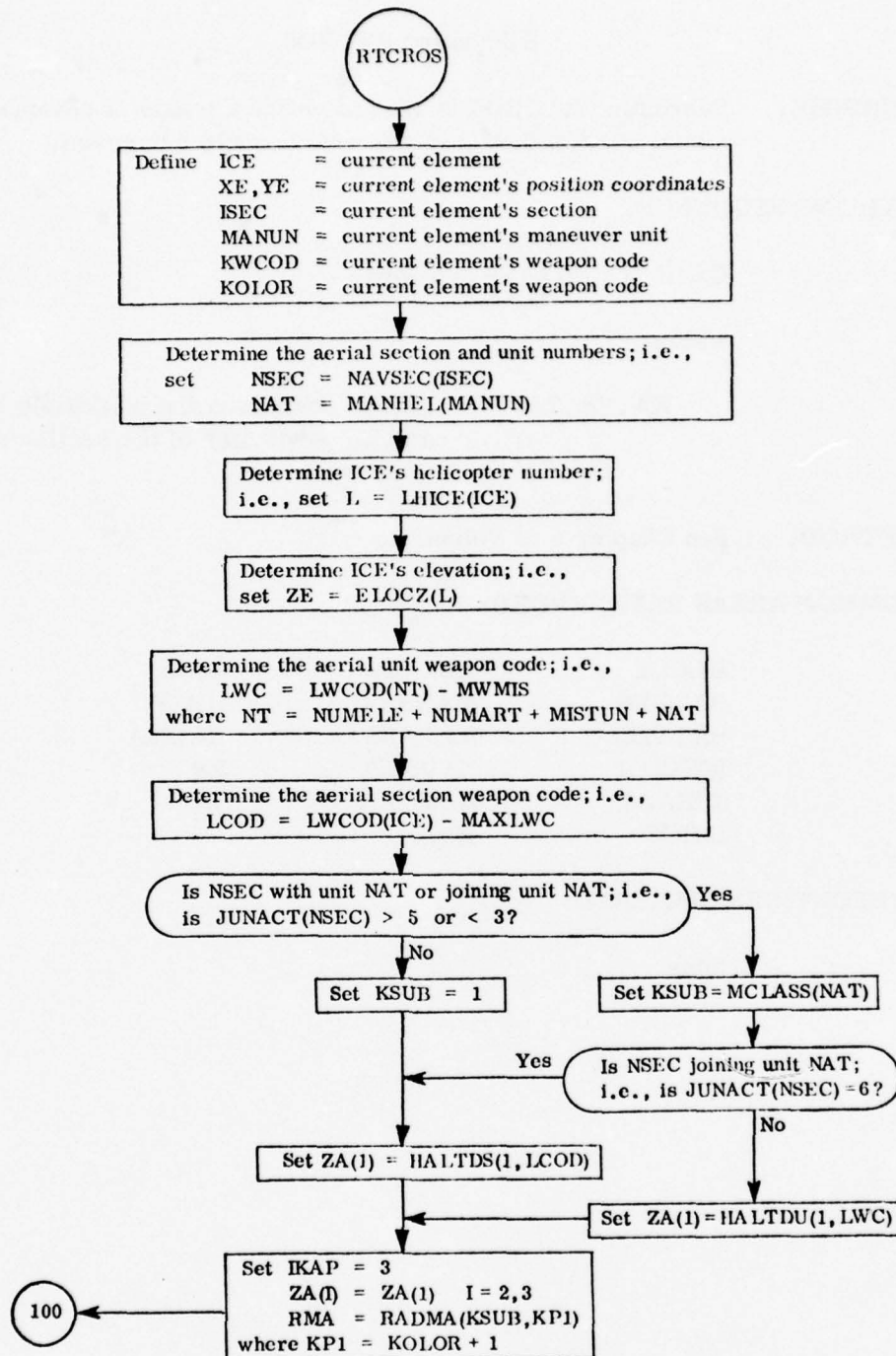
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

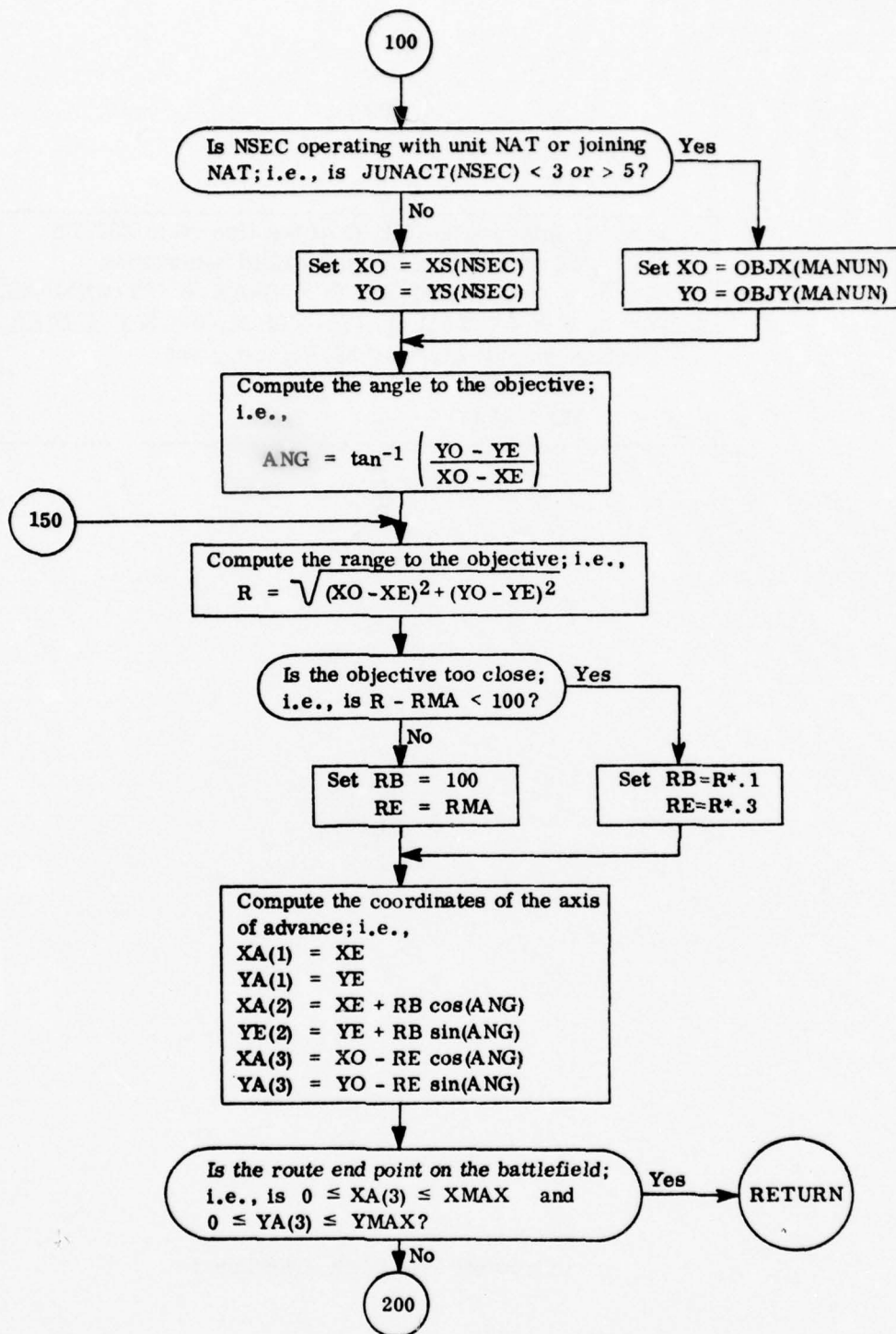
| | | |
|--------|--------|-------|
| ELOCZ | LWCOD | OBJX |
| HALTDS | MANHEL | OBJY |
| HALTDU | MCLASS | RADMA |
| ICECOM | NAVSEC | XS |
| JUNACT | NUMBER | YS |
| LHICE | ICAP | |

SUBROUTINES REQUIRED:

None



Subroutine RTCROS: Selecting a Cross-Country Route for an Aerial Section



Subroutine RTCROS: Continued
B-653

200

Find the intersection XI,YI of the line from XE,YE
to XO,YO with one of the battlefield boundaries
($X = 0, 0 \leq Y \leq YMAX$), ($X = XMAX, 0 \leq Y \leq YMAX$),
($Y = 0, 0 \leq X \leq XMAX$), ($Y = YMAX, 0 \leq X \leq XMAX$).
Redefine the objective as XI,YI; i.e., set
XO = XI
YO = YI

150

Subroutine RTCROS: Continued

B-654

Subroutine RTJOIN

PURPOSE: Subroutine RTJOIN determines a route to be followed by an aerial section joining a unit formation.

CALLING SEQUENCE:

CALL RTJOIN(XOPT,YOPT,ZOPT)

where

XOPT,YOPT,
ZOPT = coordinates of points defining the route.

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|-----|
| COPTER | MANLDR | ZRT |
| EVHTIM | NUMBER | |
| ICAP | XRT | |
| ICECOM | YRT | |

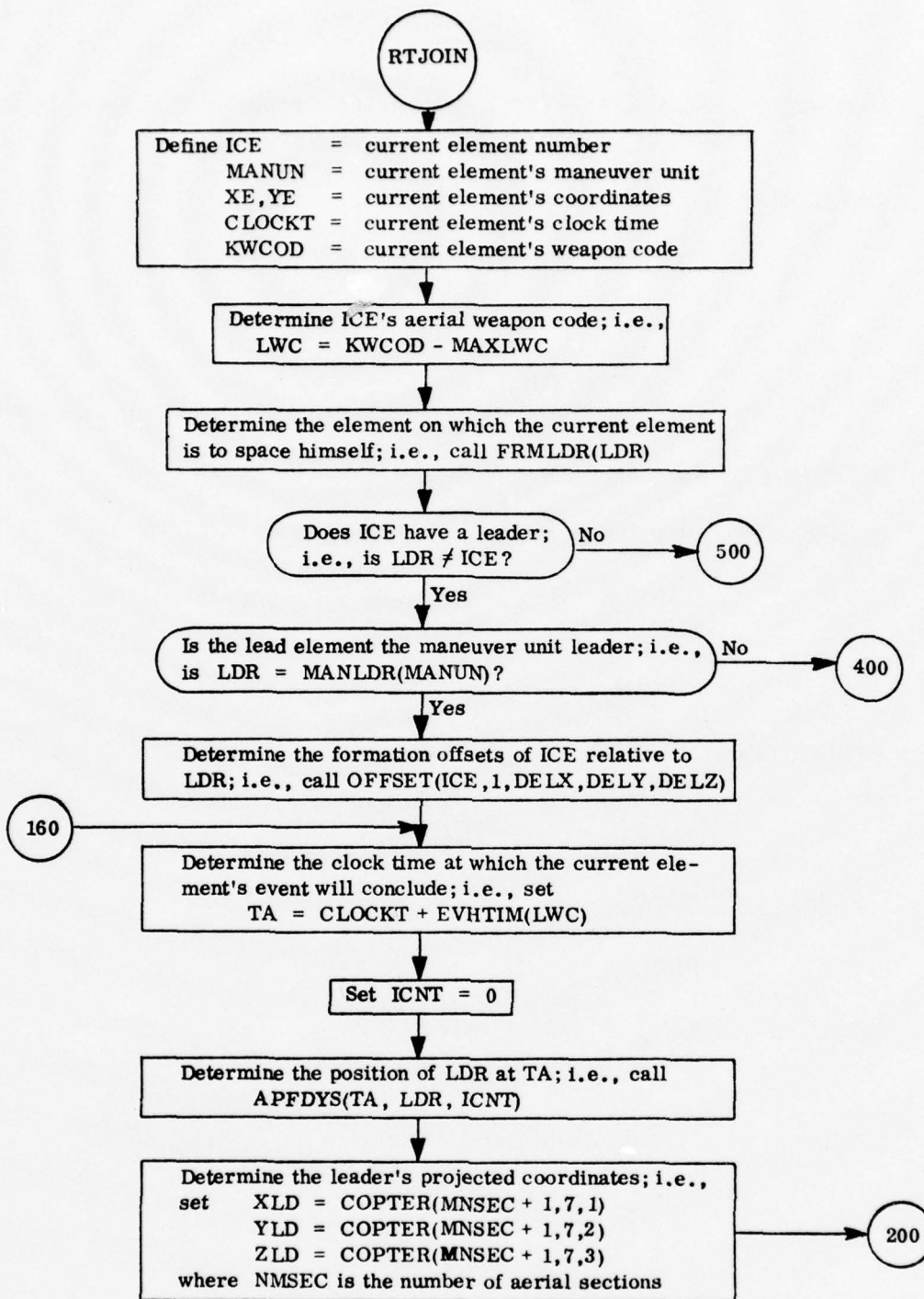
SUBROUTINES REQUIRED:

| | |
|--------|--------|
| APFDYS | FRMLDR |
| ELVATE | OFFSET |

RTJOIN CALLED BY:

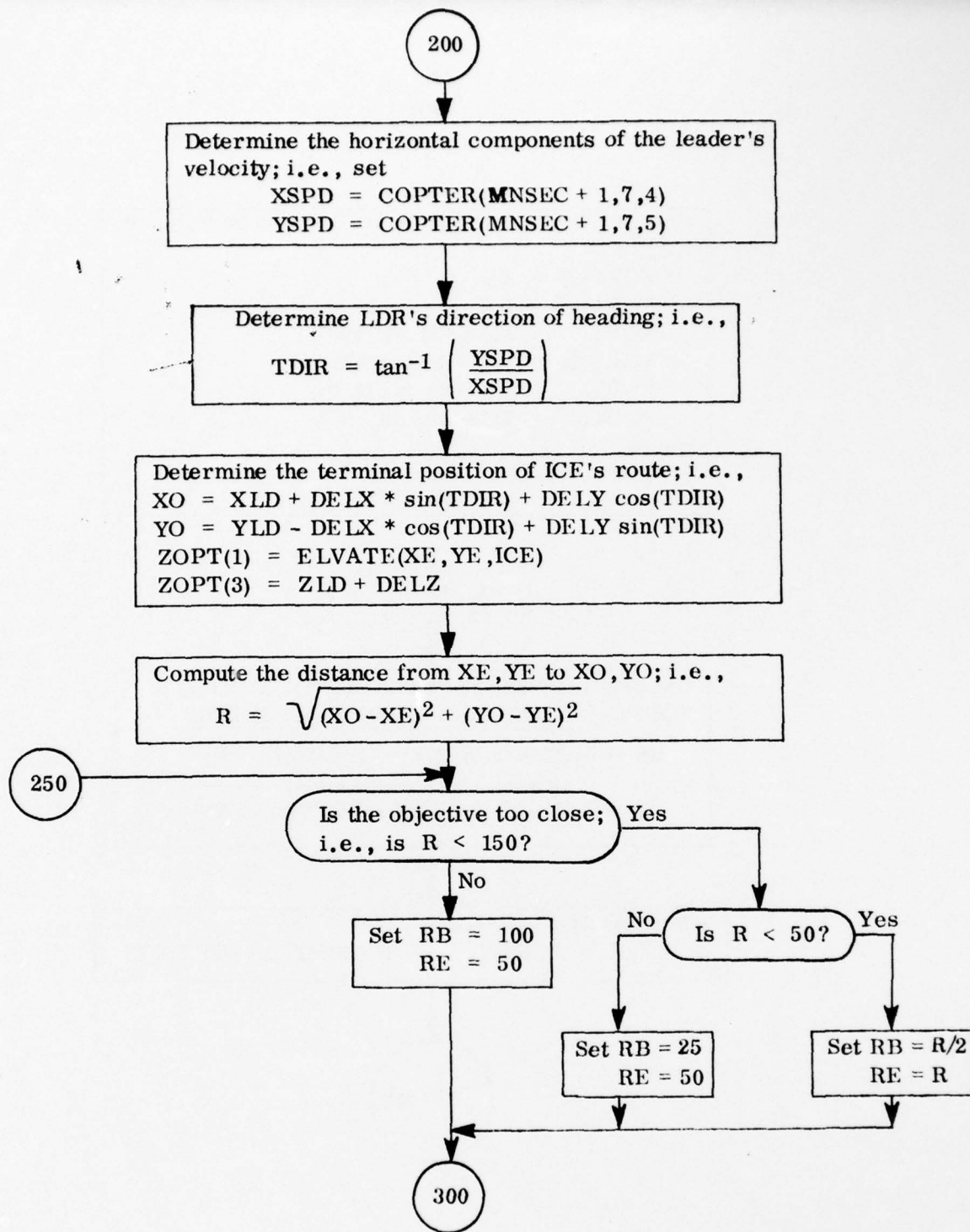
PICKRT

LENGTH: $946_{16} = 2434_{10}$ bytes

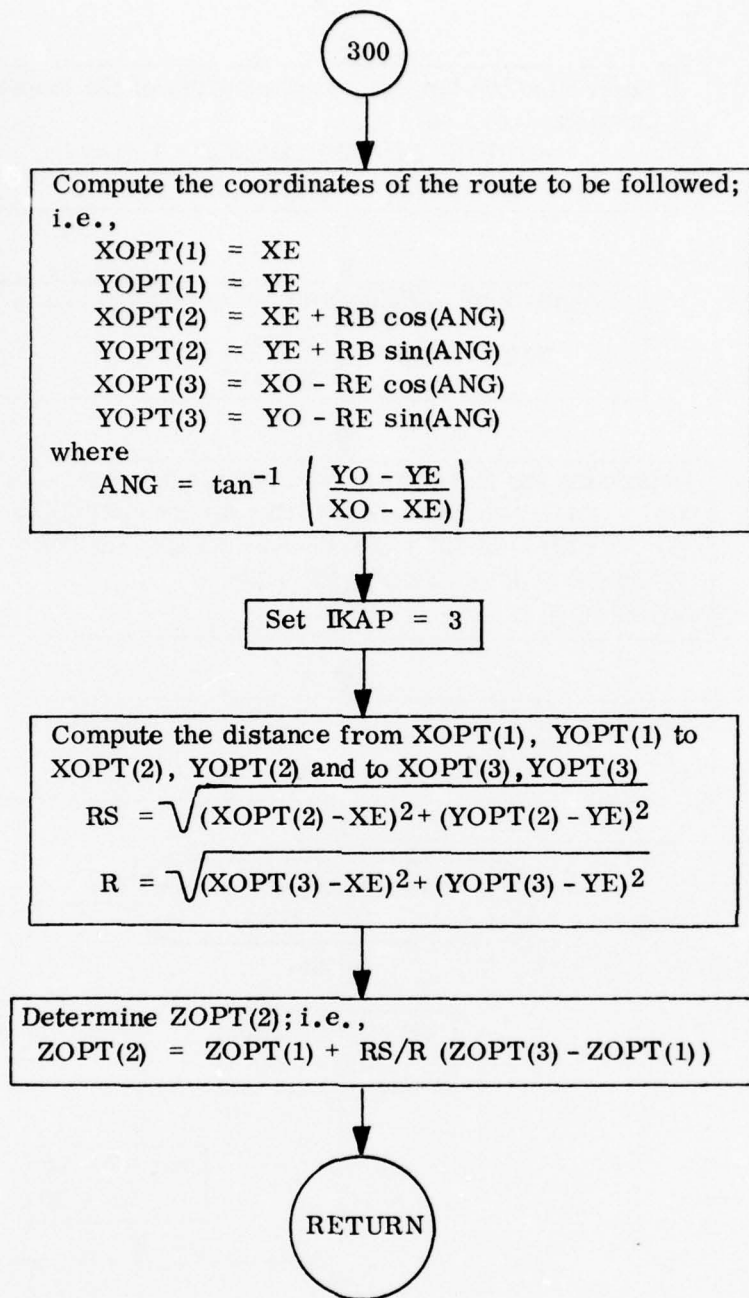


Subroutine RTJOIN: Selecting a Route for an Aerial Section
Joining a Unit Formation

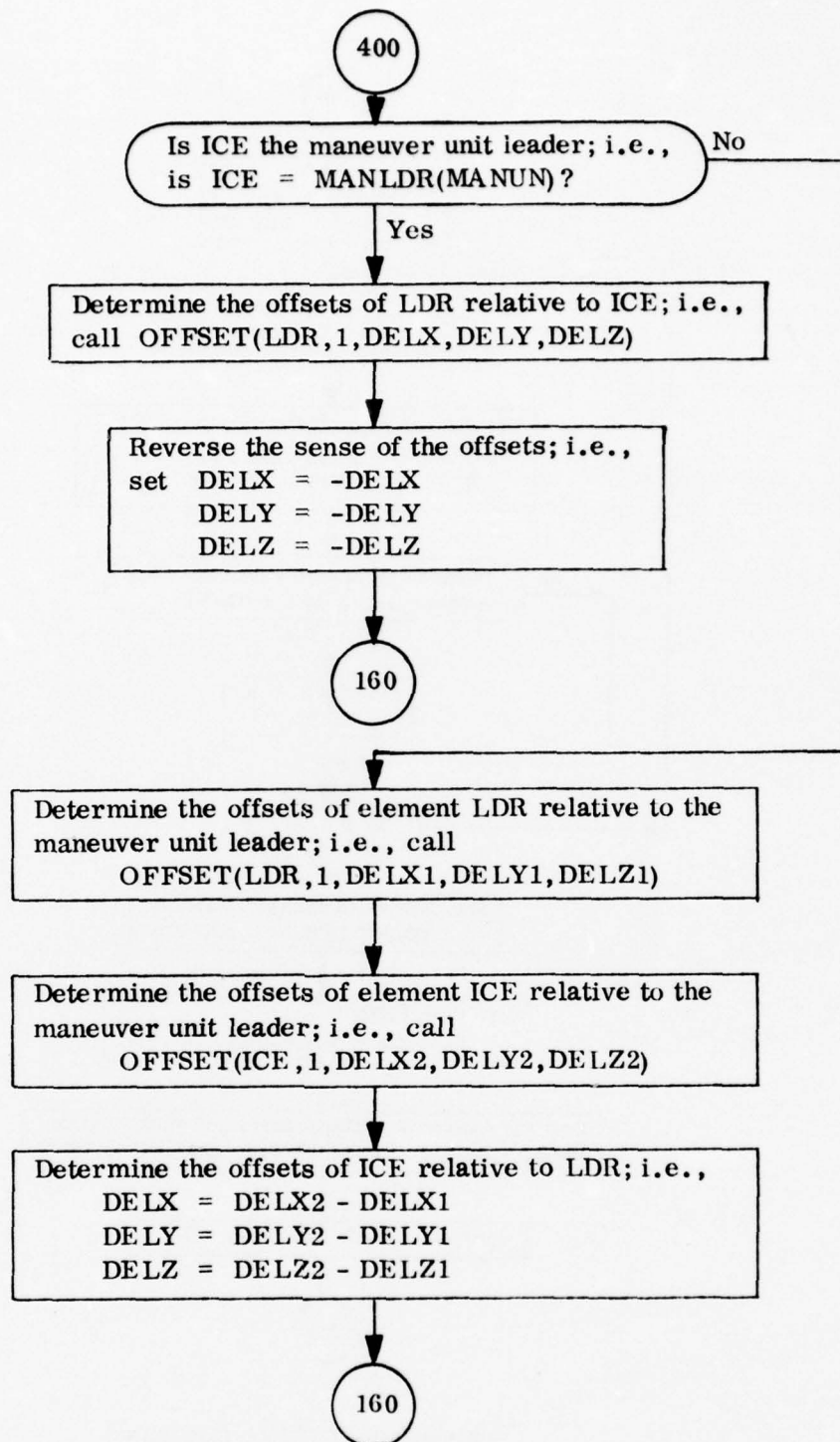
B-656



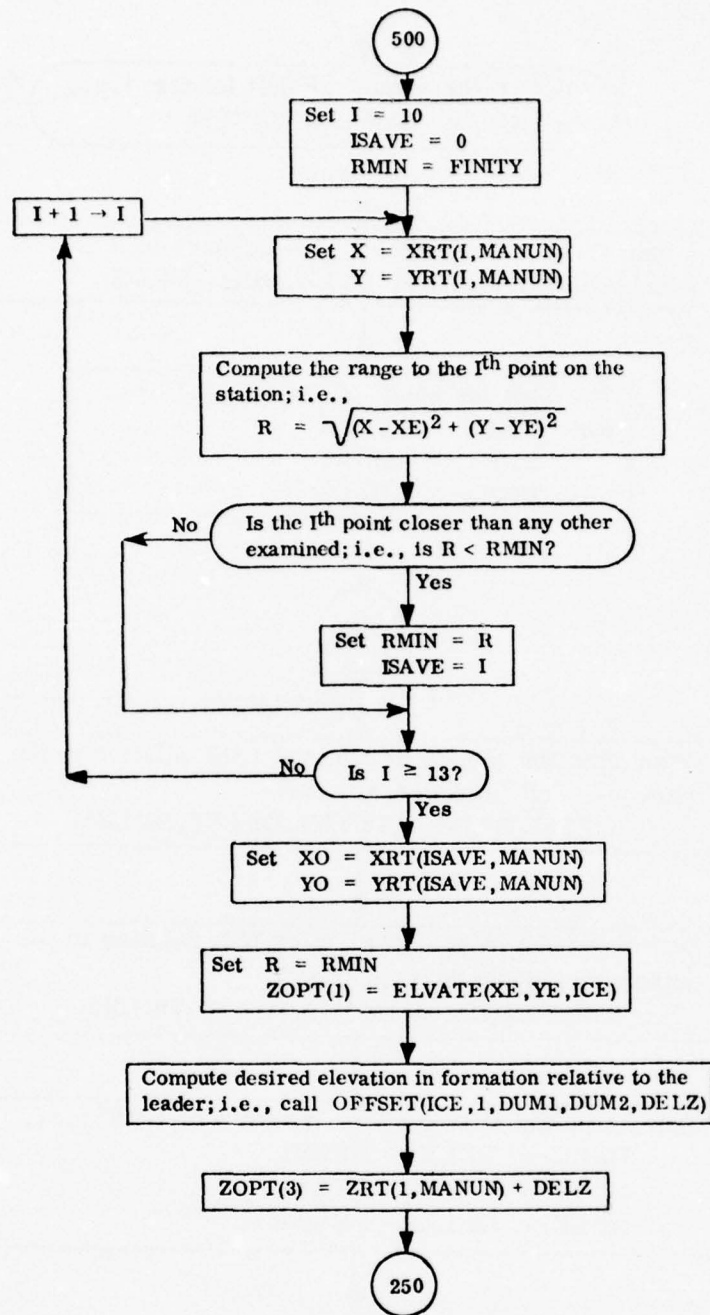
Subroutine RTJOIN: Continued



Subroutine RTJOIN: Continued



Subroutine RTJOIN: Continued



Subroutine RTJOIN: Continued

Subroutine RTLOIT

PURPOSE: Subroutine RTLOIT determines the route to be followed by an aerial section while occupying a loiter station.

CALLING SEQUENCE:

CALL RTLOIT(IRS, XOPT, YOPT, ZOPT)

where

IRS = indicator for the method to be used
in determining the loiter station route
(see subroutine PICKRT)

XOPT, YOPT,
ZOPT = coordinates of points defining the route.

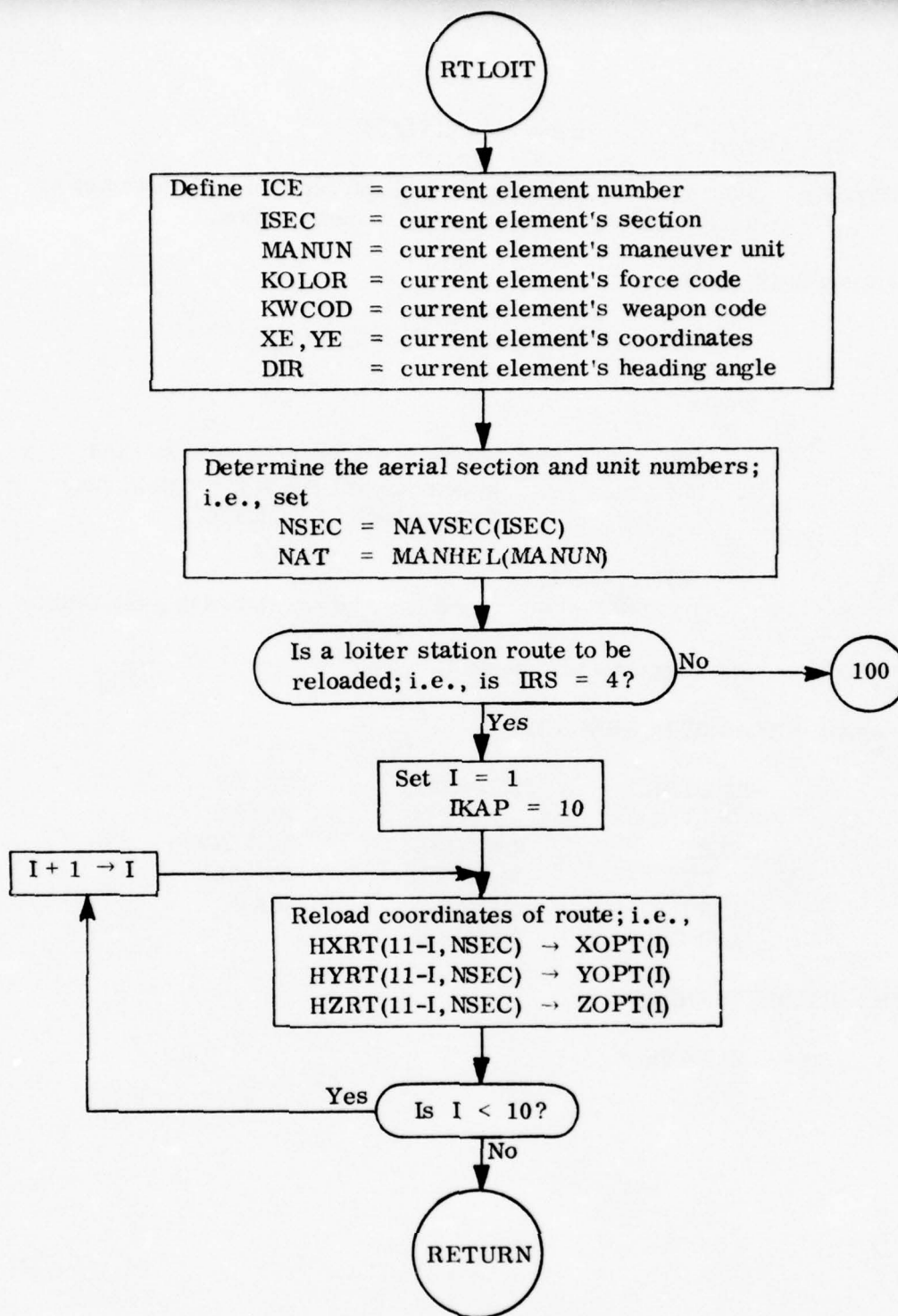
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

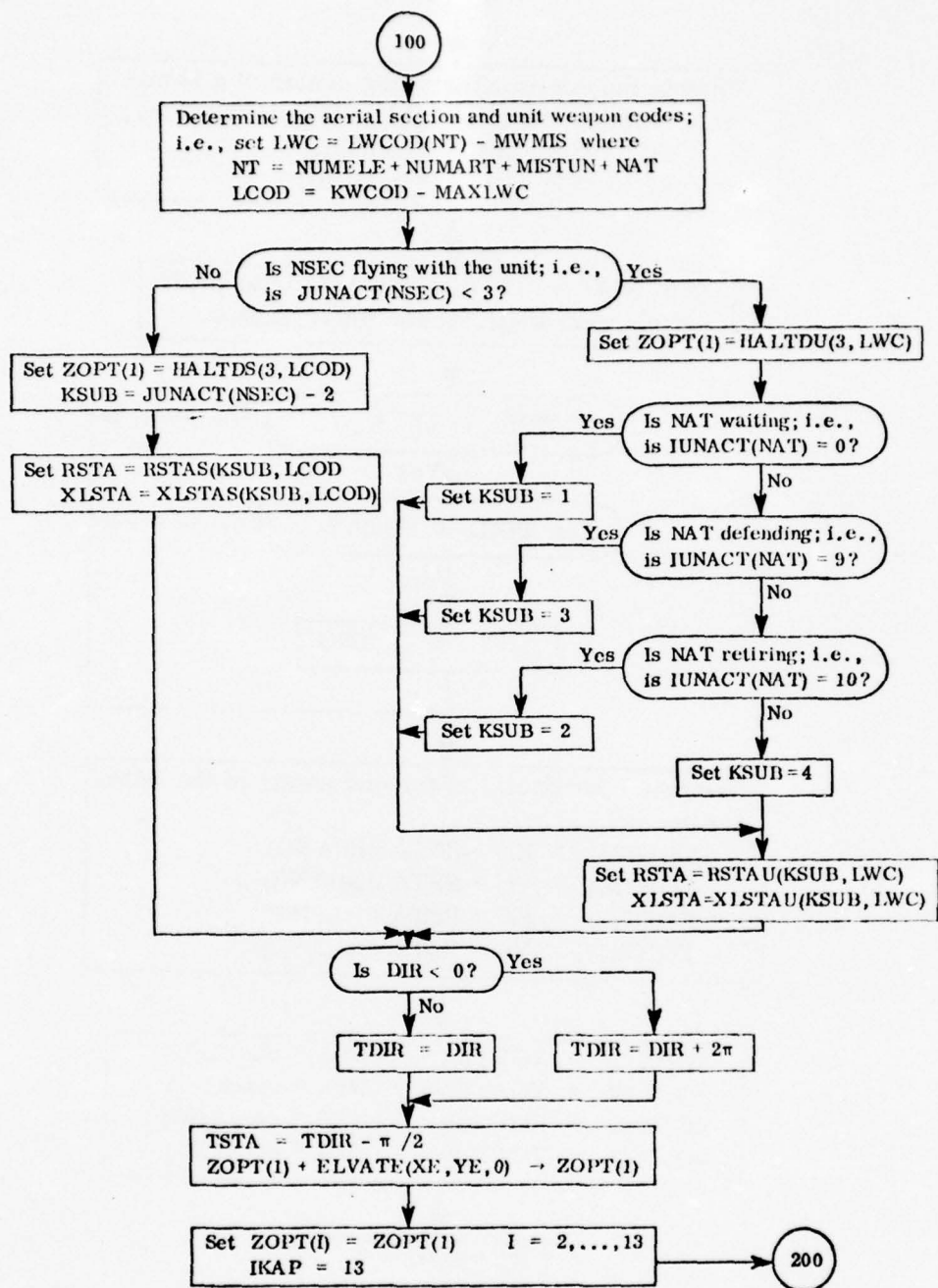
| | | |
|--------|--------|--------|
| HALTDU | IUNACT | RSTAS |
| HALTDS | JUNACT | RSTAU |
| HXRT | LWCOD | XLSTAS |
| HYRT | MANHEL | XLSTAU |
| HZRT | NAVSEC | ICAP |
| ICECOM | NUMBER | |

SUBROUTINES REQUIRED:

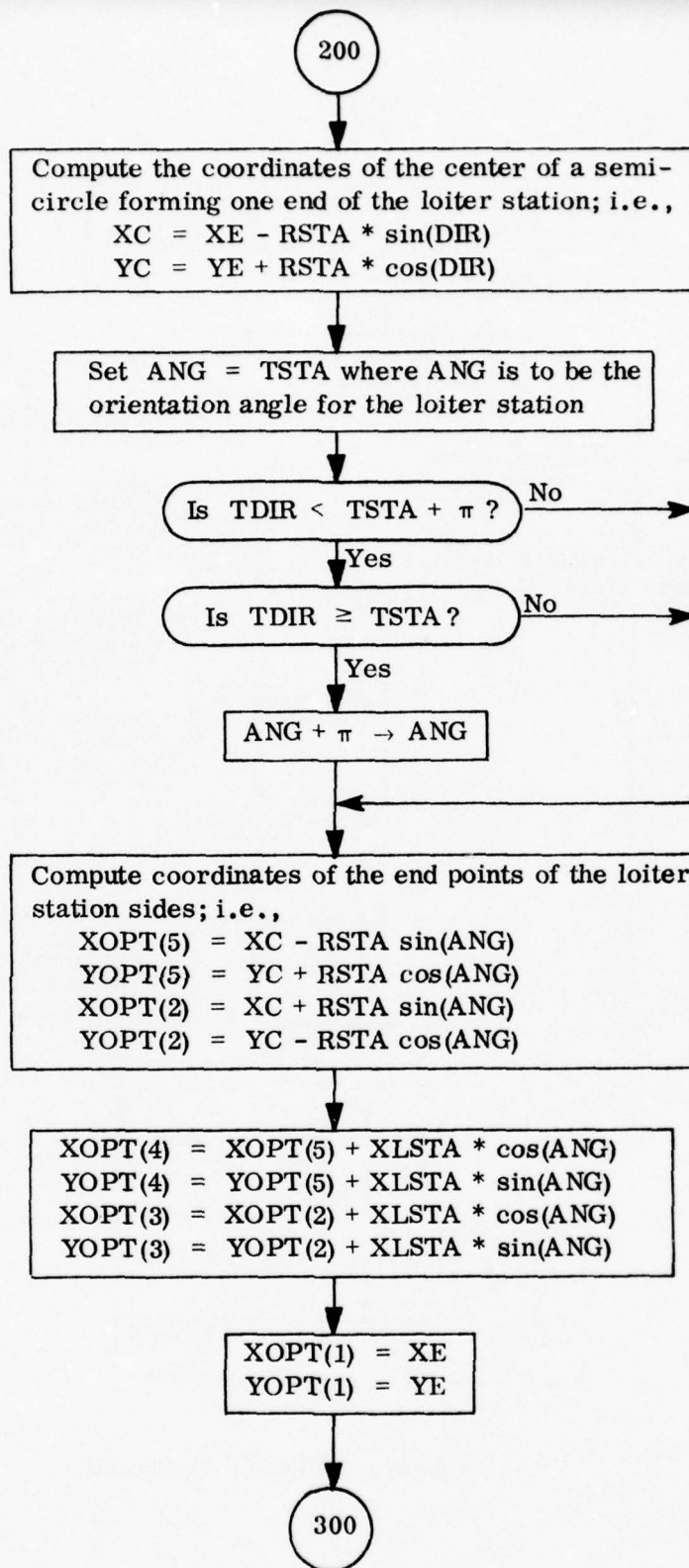
ELVATE



Subroutine RTLOIT: Selecting a Loiter Station Route
for an Aerial Section

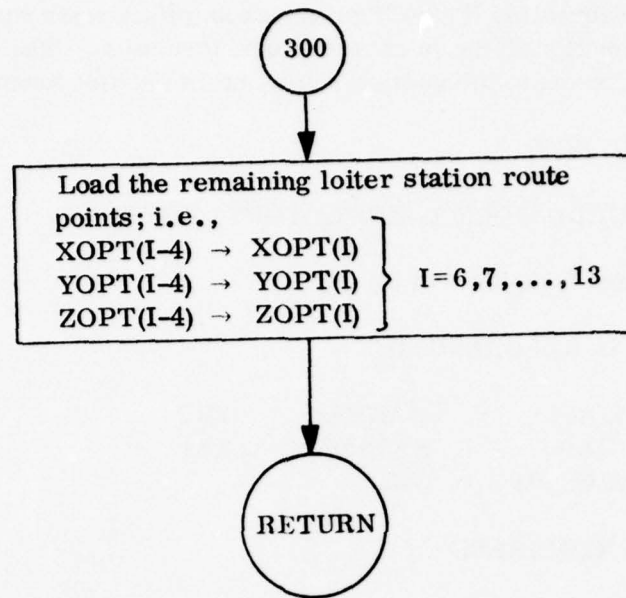


Subroutine RTLOIT: Continued



Subroutine RTLOIT: Continued

B-664



Subroutine RTLOIT: Continued

Subroutine RTSECT

PURPOSE: Subroutine RTSECT prepares an offset route for an aerial section flying in an aerial unit formation. The offset corresponds to the section's position in the unit formation.

CALLING SEQUENCE:

CALL RTSECT (XOPT, YOPT, ZOPT)

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|-----|
| ICAPI | MANHEL | YRT |
| ICAP | NAVSEC | ZRT |
| ICECOM | XRT | |

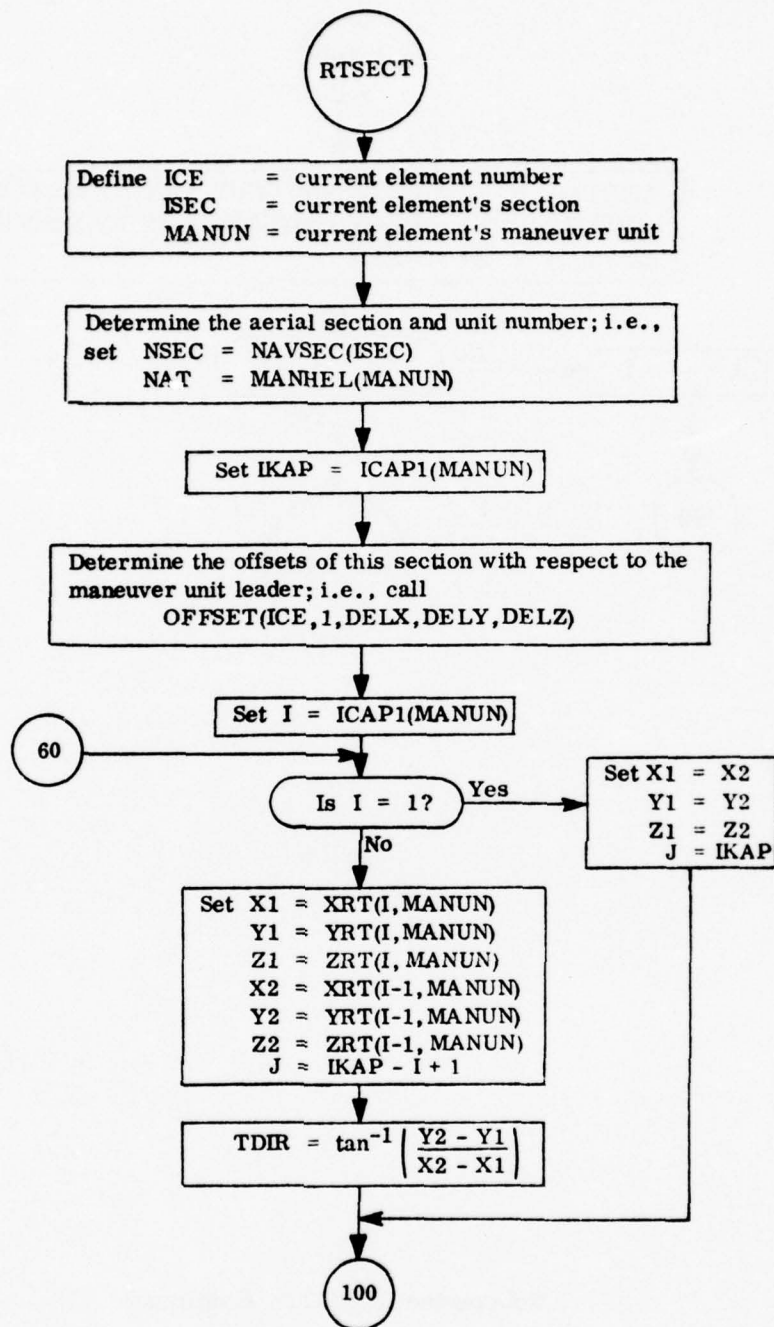
SUBROUTINES REQUIRED:

OFFSET

RTSECT CALLED BY:

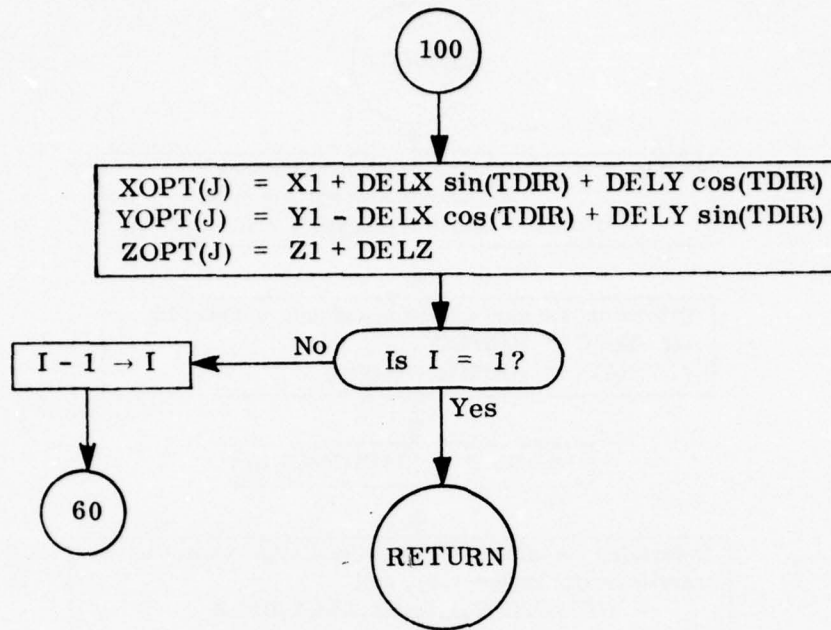
PICKRT

LENGTH: $49A_{16} = 1178_{10}$ bytes



Subroutine RTSECT: Determining a Route for an Aerial Section Flying within a Unit Formation

B-667



Subroutine RTSECT: Continued

Subroutine RTSELH

PURPOSE: Subroutine RTSELH selects a route for an aerial vehicle section traveling cross country.

CALLING SEQUENCE:

CALL RTSELH(XA, YA, ZA, XOPT, YOPT, ZOPT)

where

XA, YA, ZA = input arrays describing the axis of advance for the section

XOPT, YOPT,
ZOPT = arrays describing the cross-country route selected (output)

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| RTKONH | ET | LKILL |
| TACKON | SCAPH | EW |
| ICECOM | LHICE | EMICR |
| SPTS | TGTDIM | ESMH |
| S | LWCOD | RTSIZE |
| T | LDET | ICAP |

SUBROUTINES REQUIRED:

| | |
|--------|--------|
| CLOCK | HDIF |
| ELOC | LOSS |
| ELVATE | XYLOCH |
| ERROR | |

RTSELH CALLED BY:

PICKRT

LENGTH: 2E78 = 11896 bytes
16 10

RTSELH

Define KOLOR = force code of the current element
IFEELE = first enemy element number
ILEELE = last enemy element number
XA, YA, ZA = input arrays describing axis of advance
EMIN = route selection grid point spacing parameter
ISTRT = route selection grid row containing the route initial point
JSTRT = route selection grid column containing the route initial point
IFIN = route selection grid row containing the route end point
JFIN = route selection grid column containing the route end point
IRTSIZE = maximum number of points allowed in a route

Record the input final route point row number;
i.e., set SAVE2 = IFIN

Record the input grid spacing parameter; i.e.,
set SAVE1 = EMIN

Find the desired altitude of the section leader
while executing the route; i.e., set CLH = ZA(1)

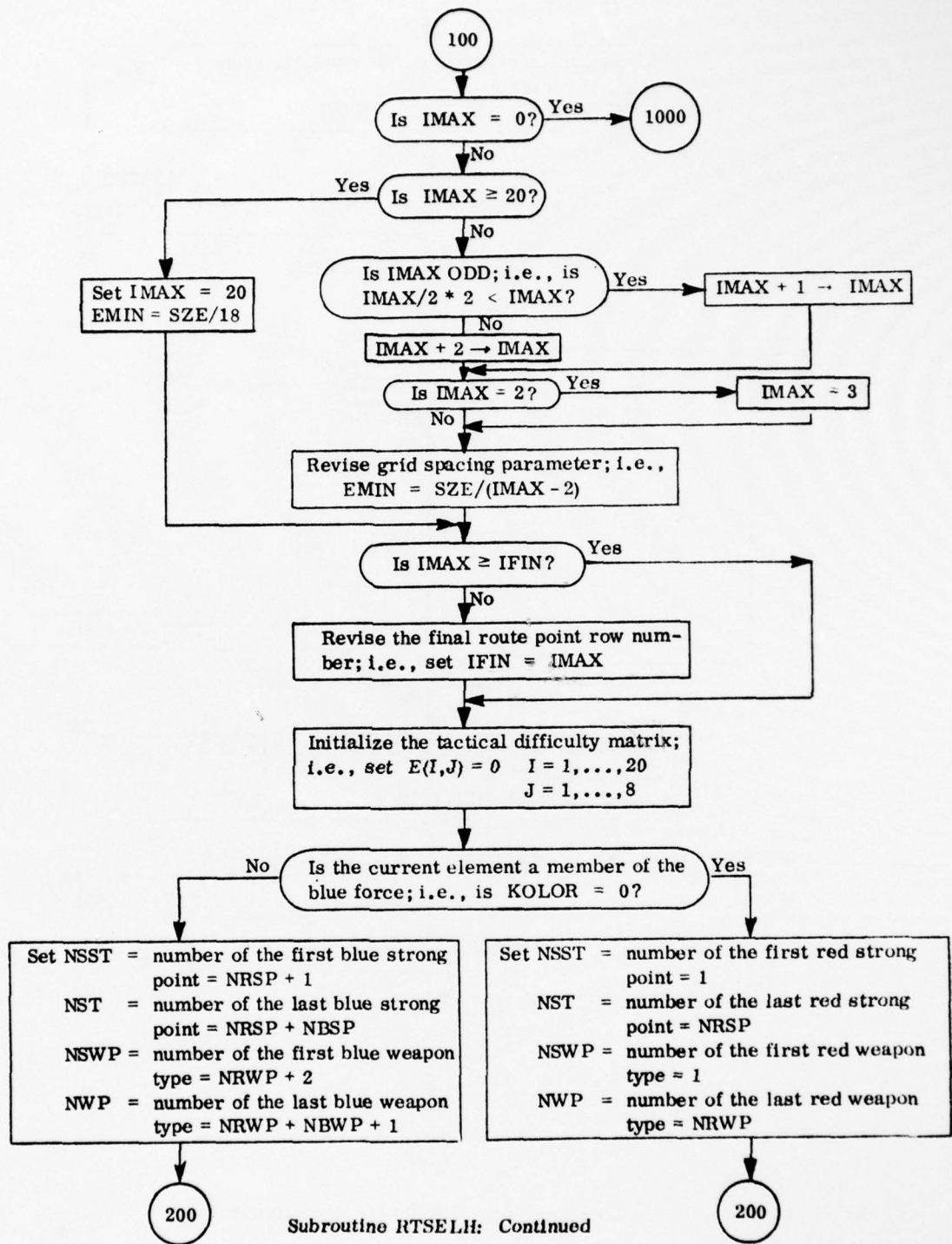
Determine the position of the objective relative
to the current element; i.e.,
 $XOS = XA(ICAP) - XE$
 $YOS = YA(ICAP) - YE$

Compute the length of the axis of advance; i.e.,
 $SZE = \sqrt{XOS^2 + YOS^2}$

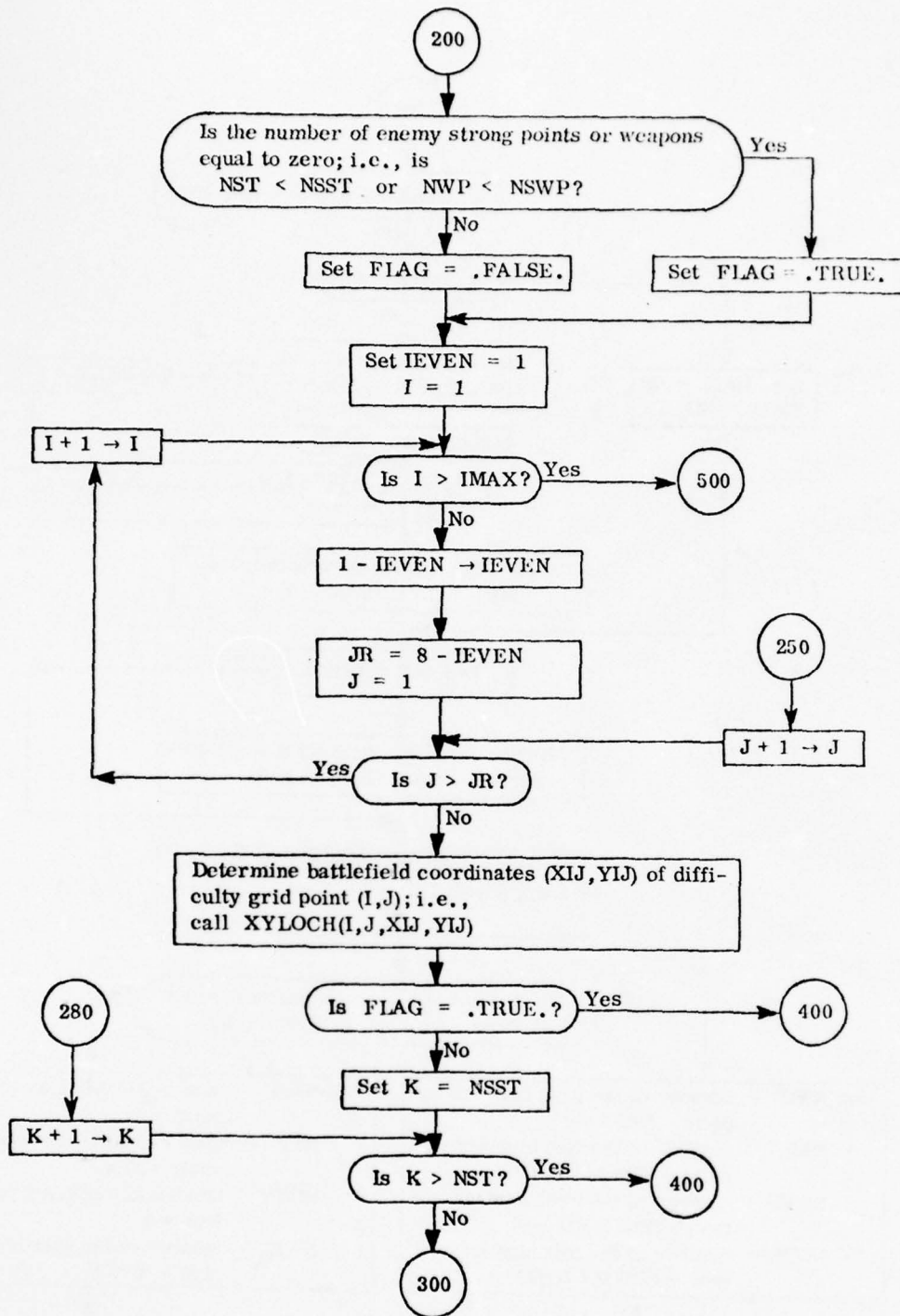
Determine the desired number of rows for the
route selection grid; i.e.,
 $IMAX = SZE/EMIN + .01$

100

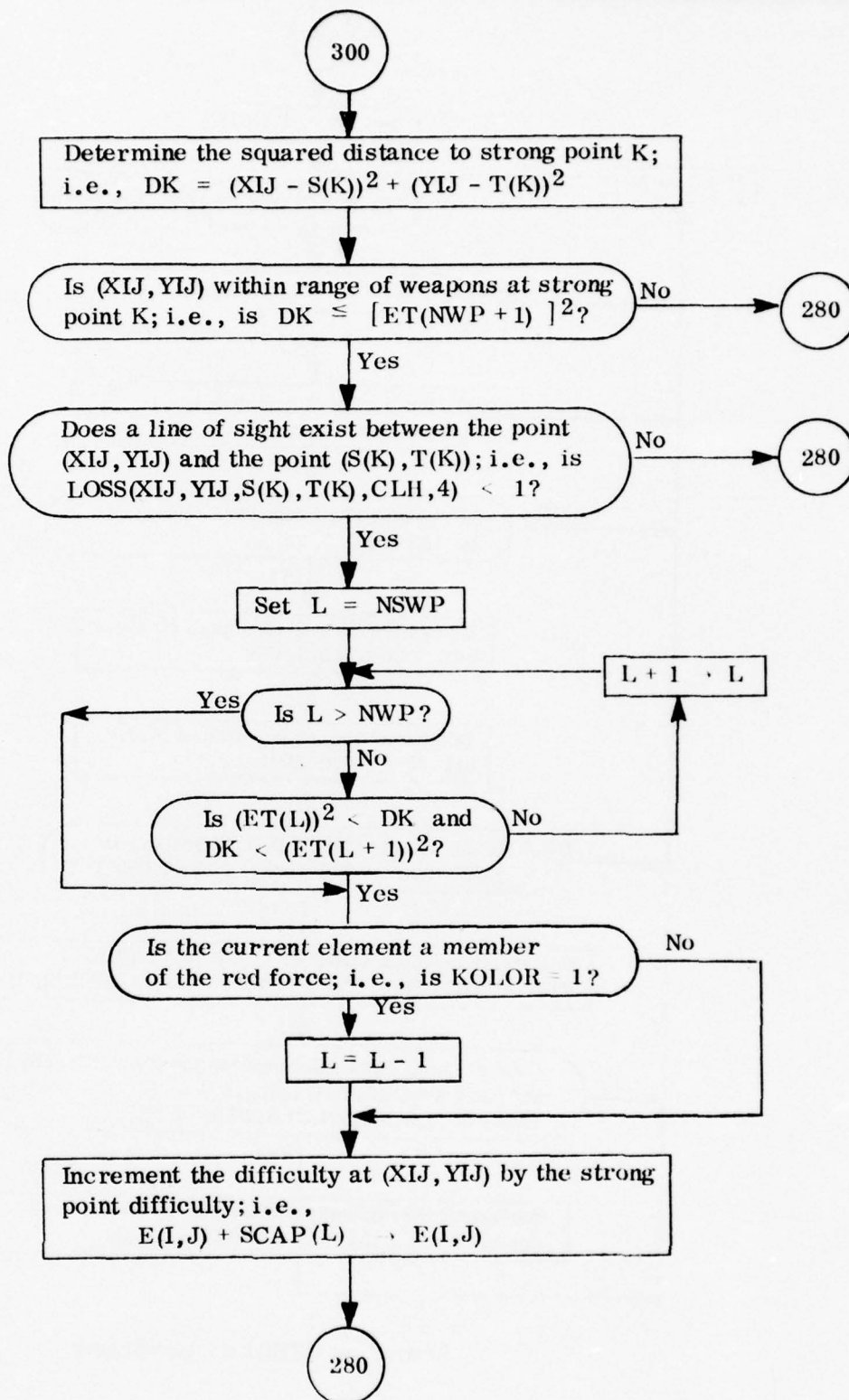
Subroutine RTSELH: Cross Country Route Selection
B-670



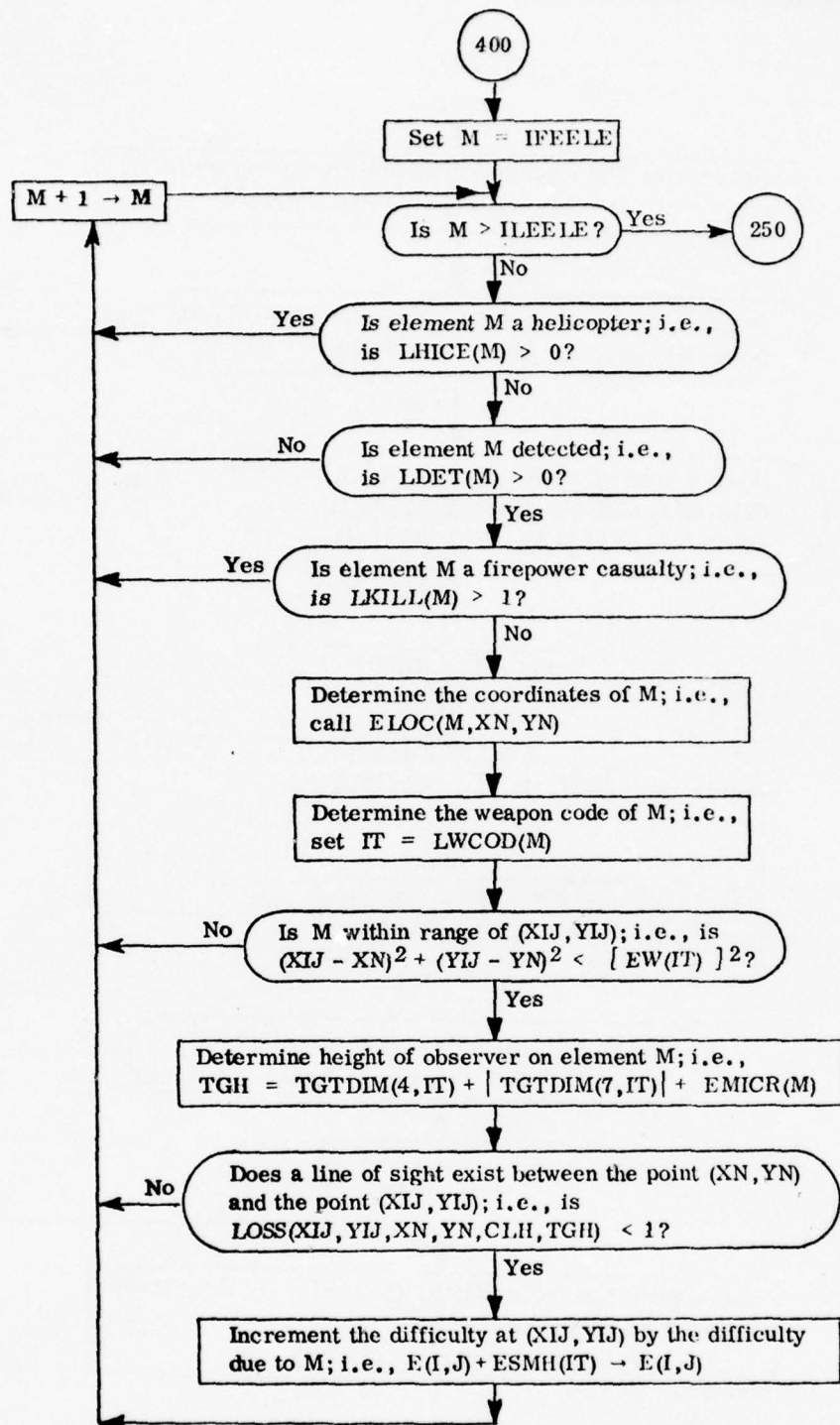
Subroutine RTSELH: Continued



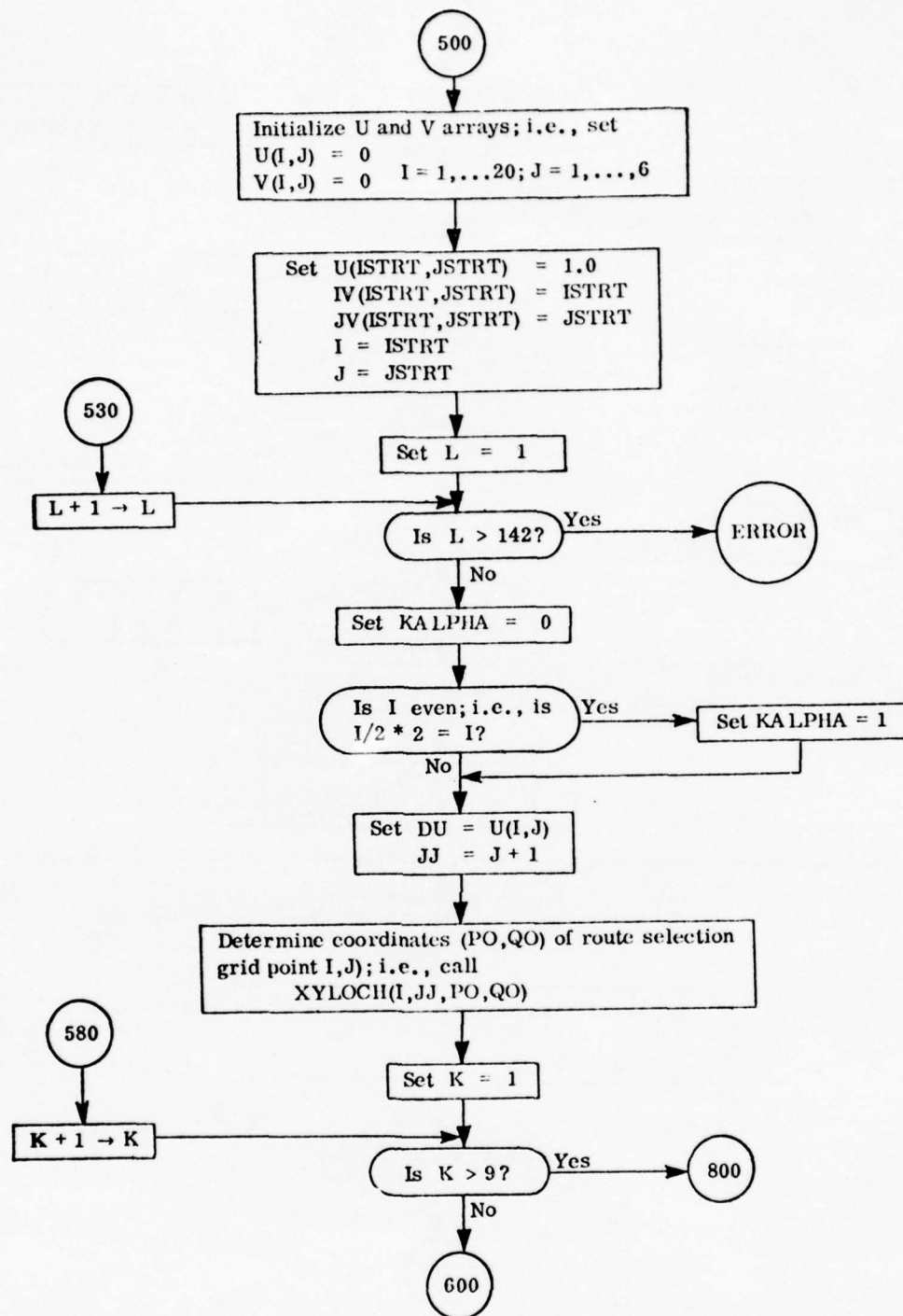
Subroutine RTSELH: Continued



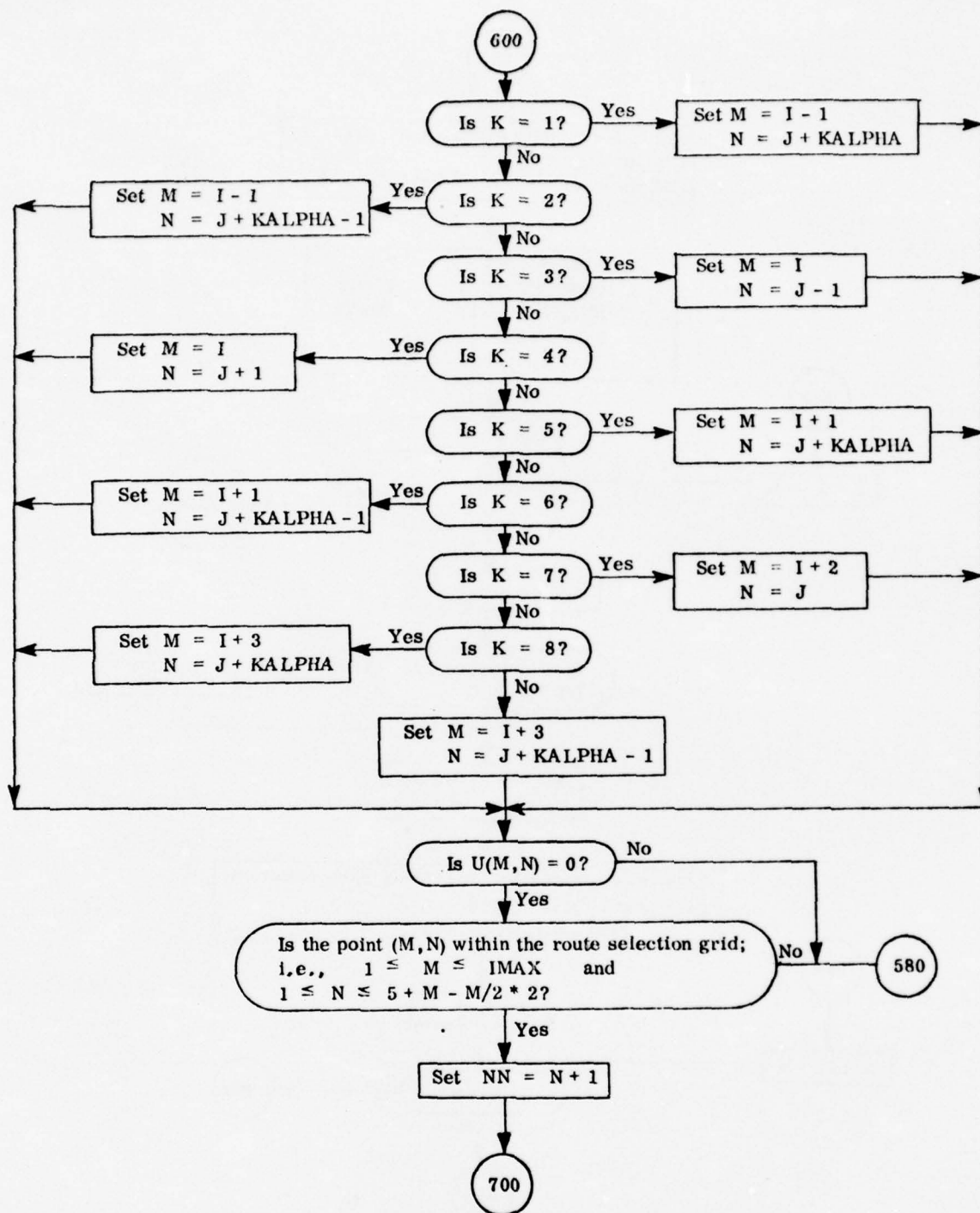
Subroutine RTSELII: Continued



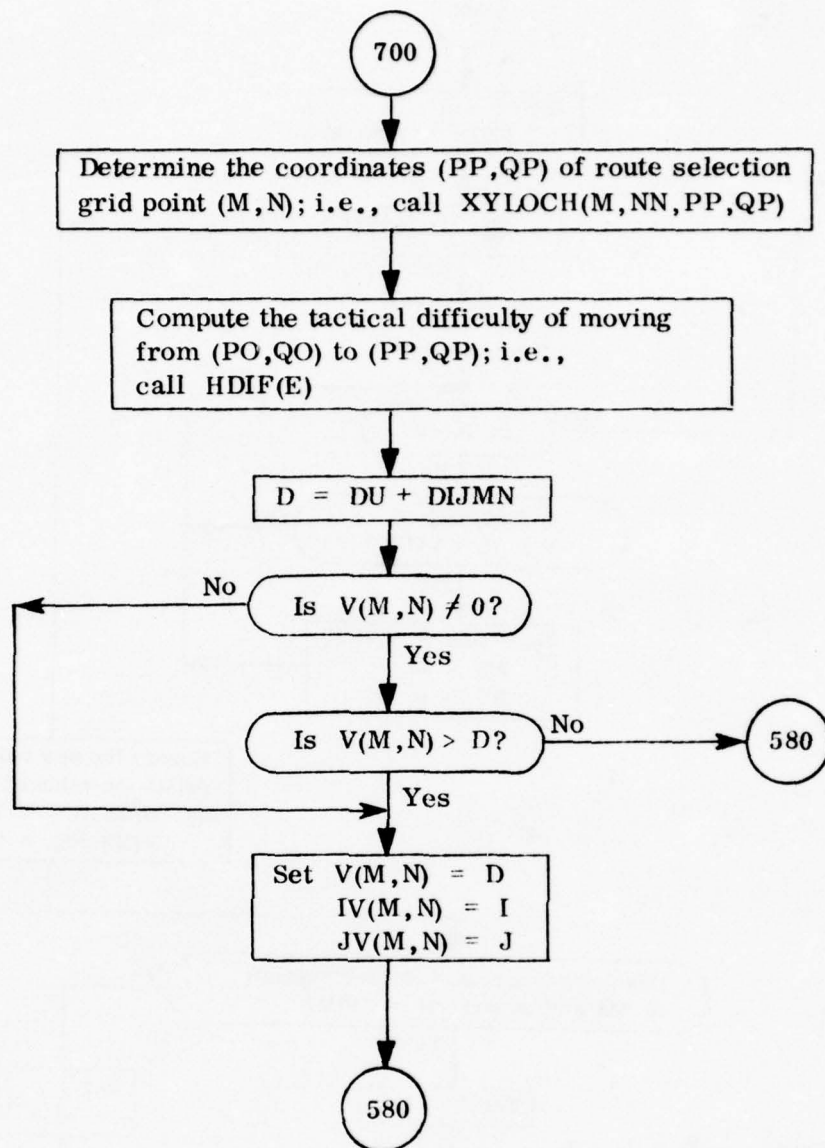
Subroutine RTSELH: Continued



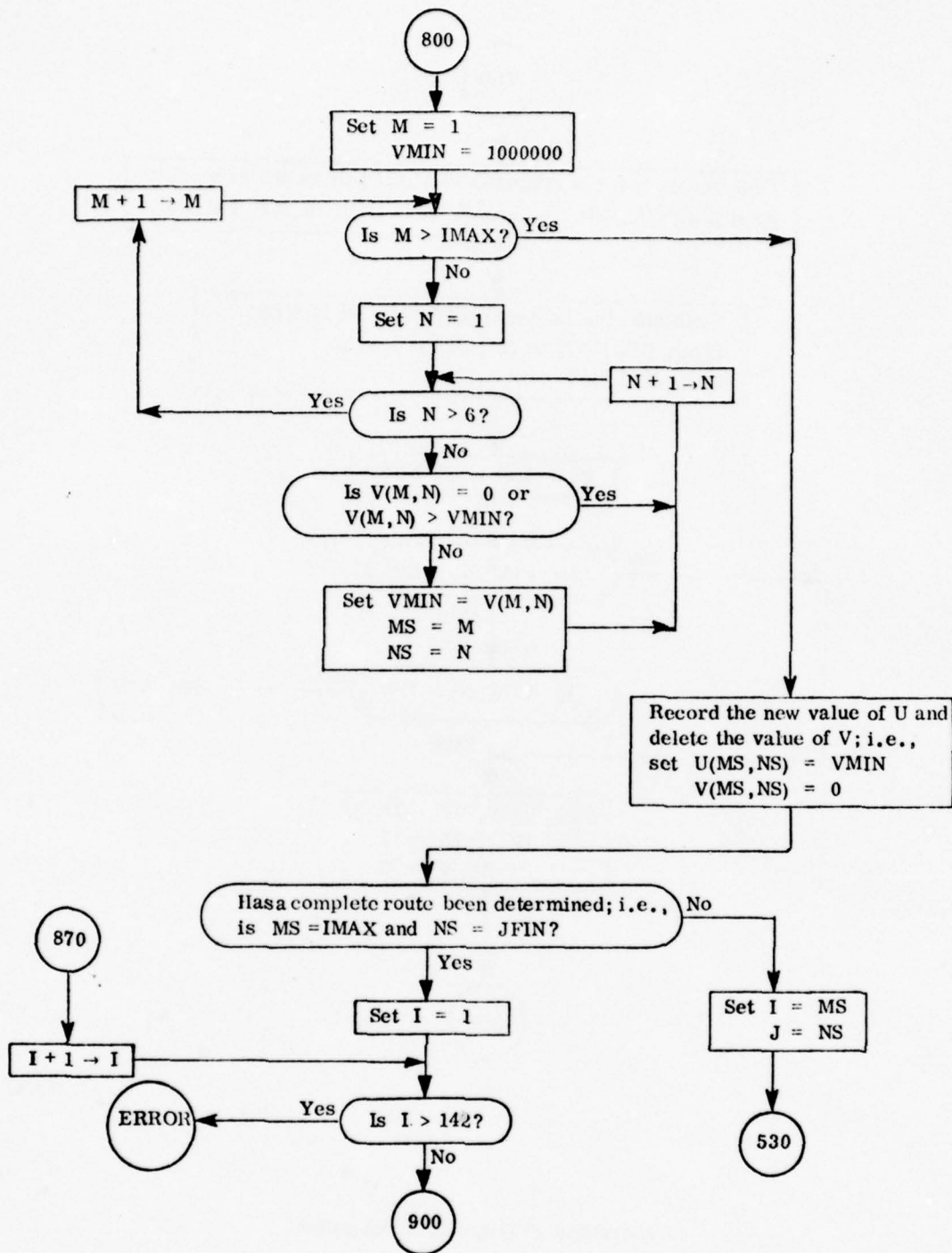
Subroutine RTSELH: Continued



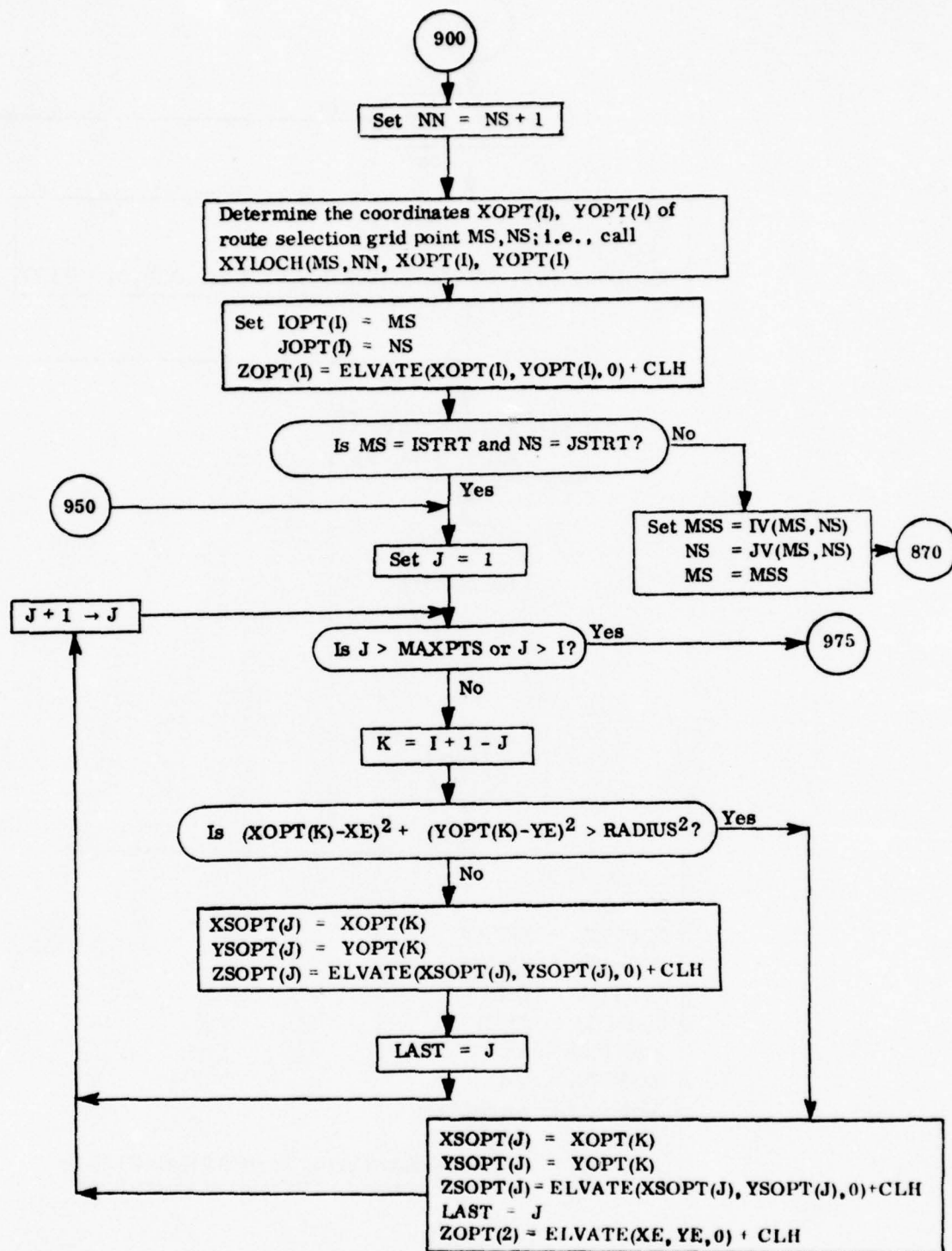
Subroutine RTSELH: Continued



Subroutine RTSELH: Continued

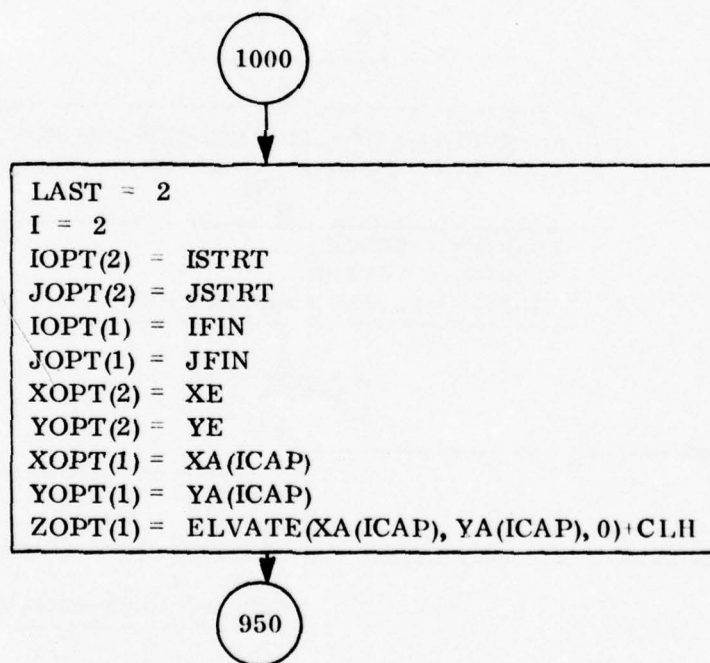
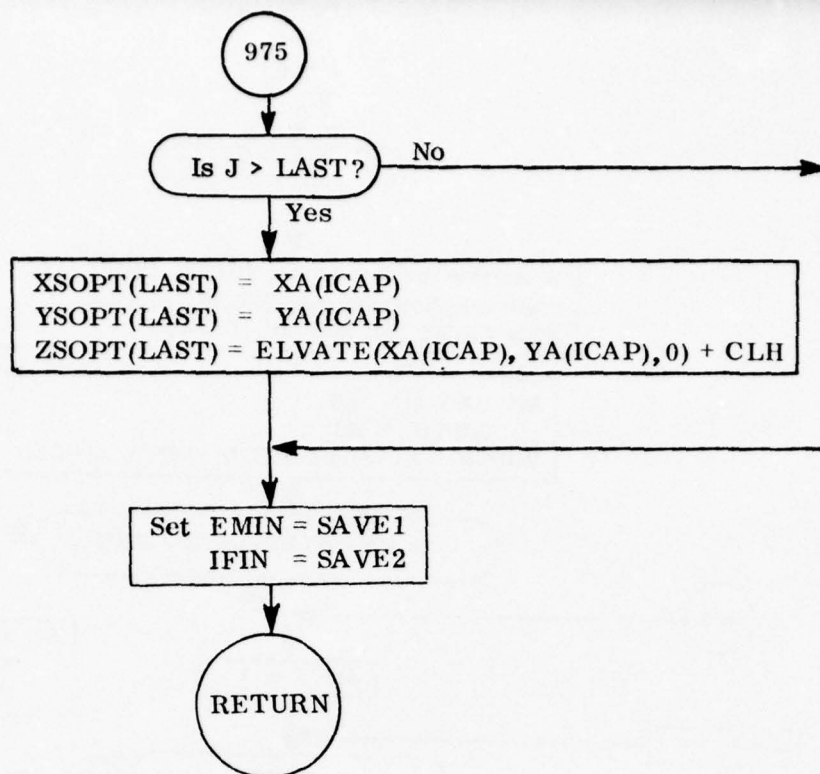


Subroutine RTSELH: Continued



Subroutine RTSELH: Continued

B-679



Subroutine RTSELH: Continued

Subroutine RTSRCH

PURPOSE: Subroutine RTSRCH is used to determine the route to be followed by an aerial section that is searching for targets.

CALLING SEQUENCE:

CALL RTSRCH(XOPT,YOPT,ZOPT)

where

XOPT,YOPT,
ZOPT = arrays containing the battlefield X,Y,
and Z coordinates of points defining
the route.

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| ELOCZ | LHICE | NUMBER |
| HALTDS | LWCOD | OBJX |
| HALTDU | MANHEL | OBJY |
| ICAP | MAPCOM | RADMA |
| ICECOM | MCLASS | |
| IUNACT | NAVSEC | |

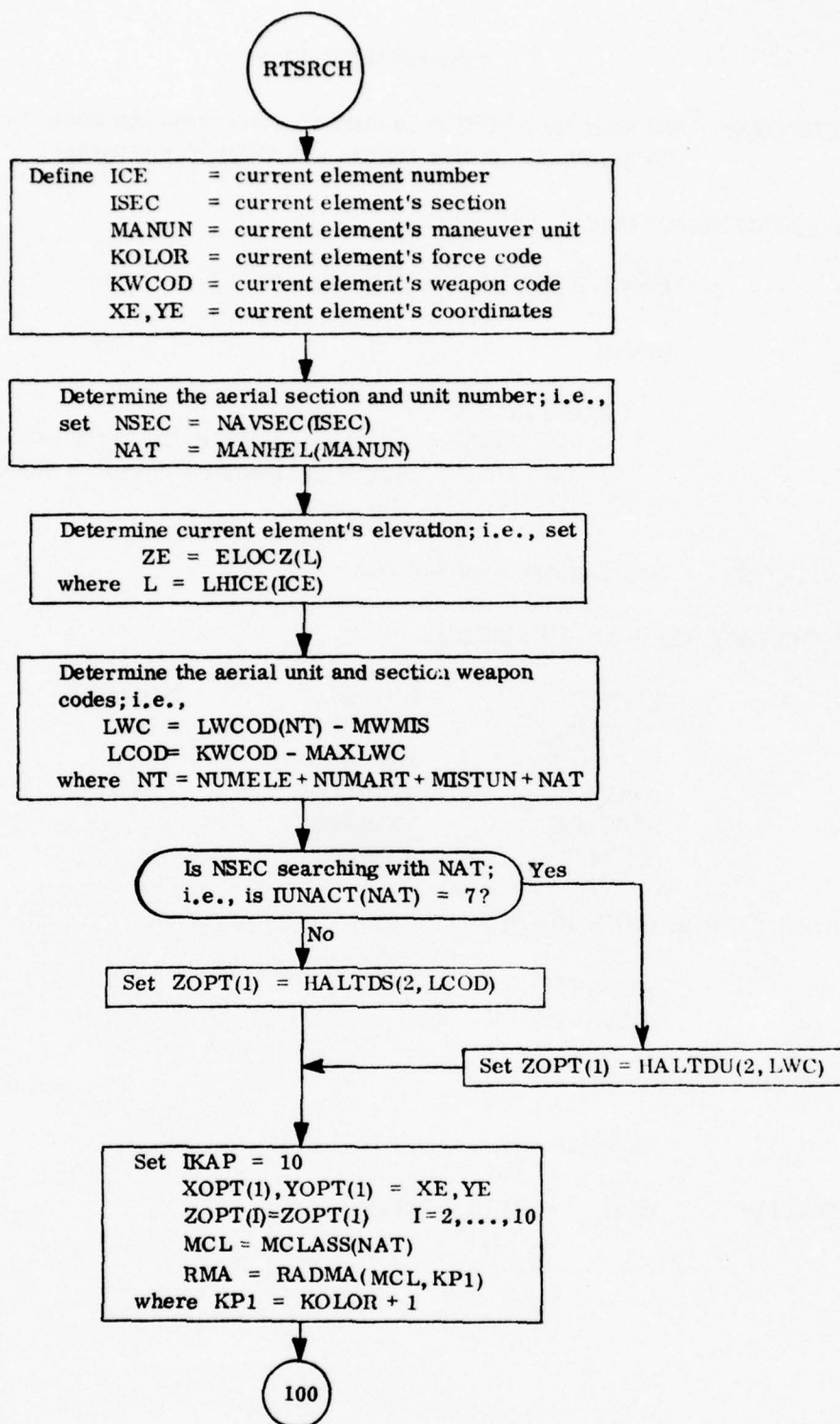
SUBROUTINES REQUIRED:

ELVATE
FRANUD

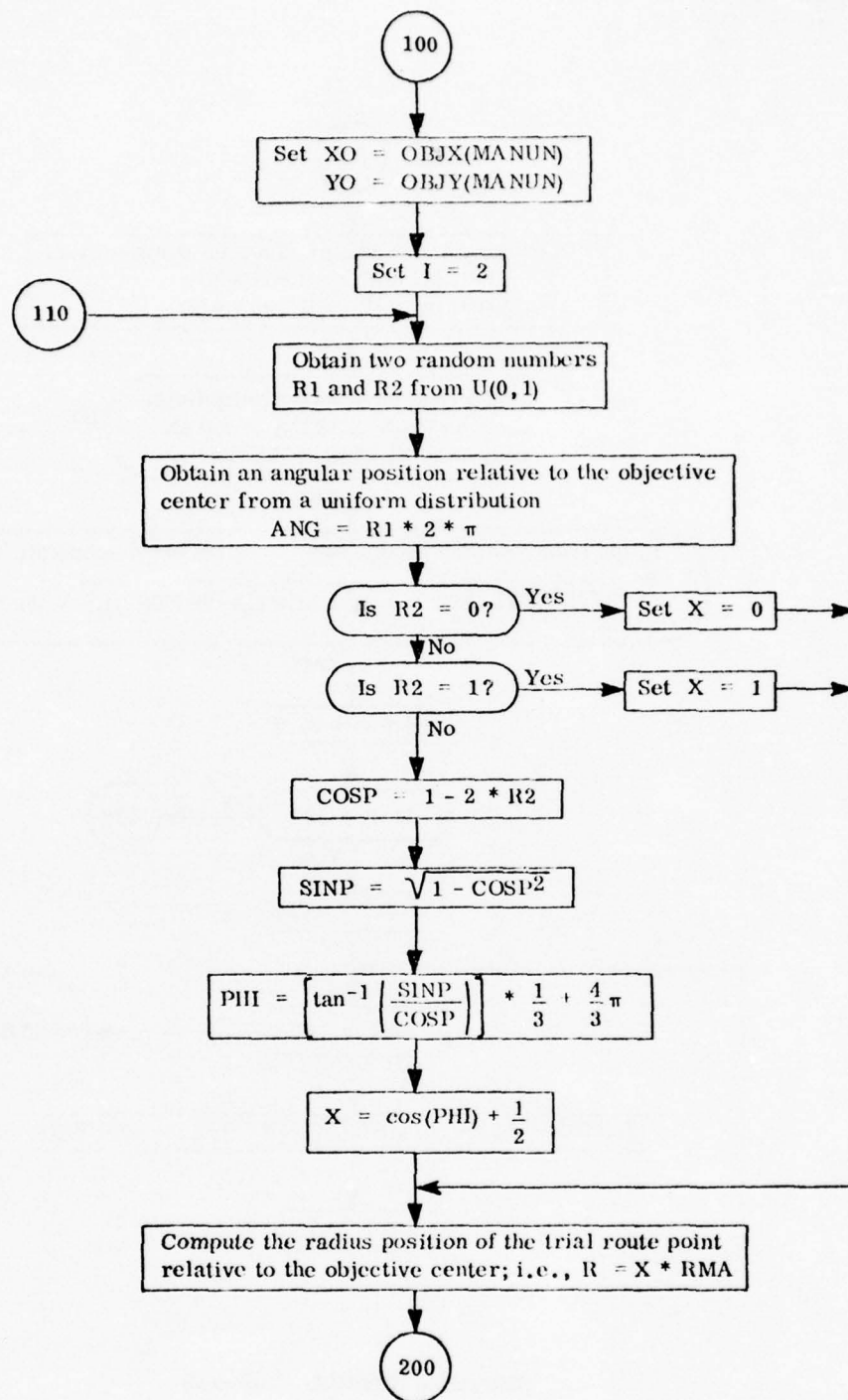
RTSRCH CALLED BY:

PICKRT

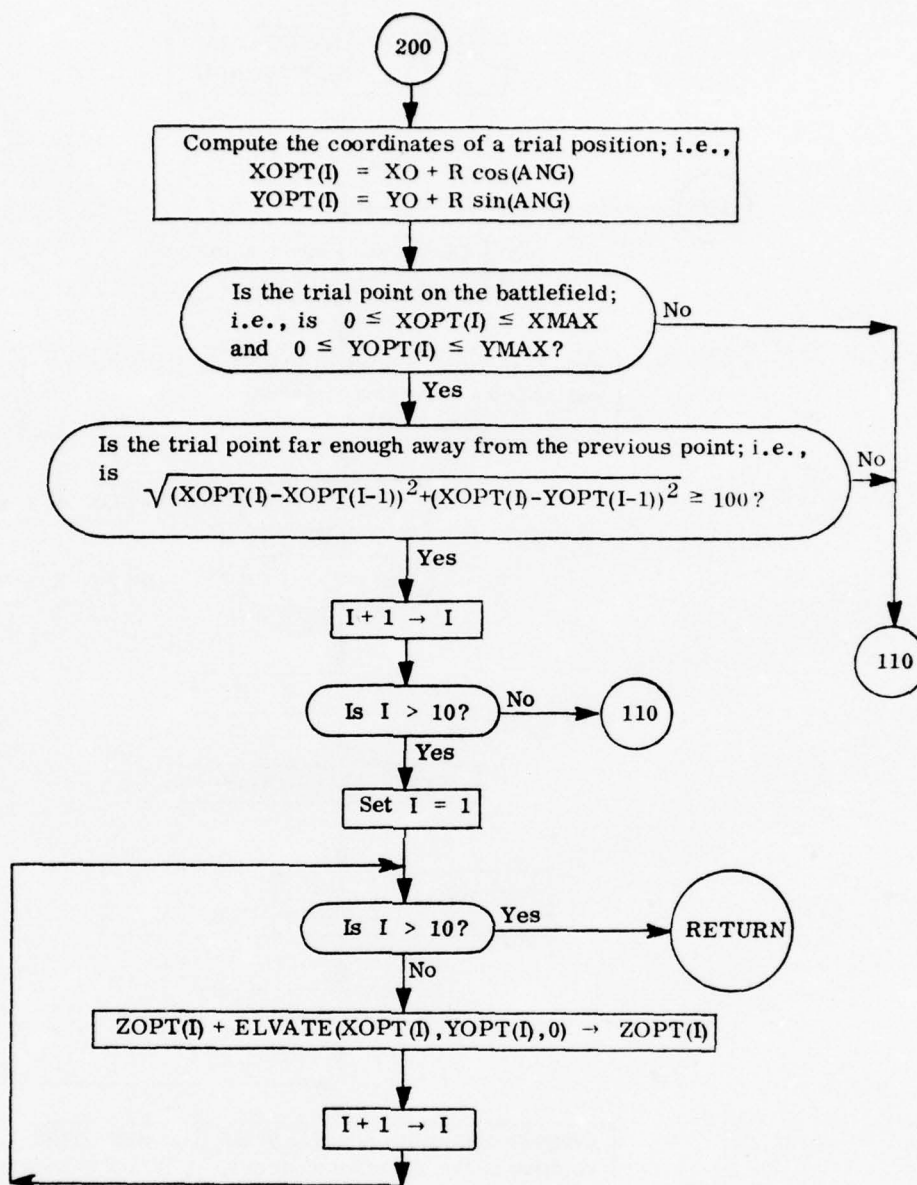
LENGTH: $6FO_{16} = 1776_{10}$ bytes



Subroutine RTSRCH: Selecting a Search Route for an Aerial Section
B-682



Subroutine RTSRCH: Continued



Subroutine RTSRCH: Continued

Subroutine SECPRM

PURPOSE: Subroutine SECPRM sets the formation and speed for an aerial section that is commencing independent movement. In addition, if the section is leaving its maneuver unit and the section leader is the unit leader, the new unit leader is chosen.

CALLING SEQUENCE:

CALL SECPRM(IFTN)

where

IFTN = { flag giving movement activity being
performed by the current element's section
1 for enroute movement
2 for loiter station movement
3 for target search
4 for target attack

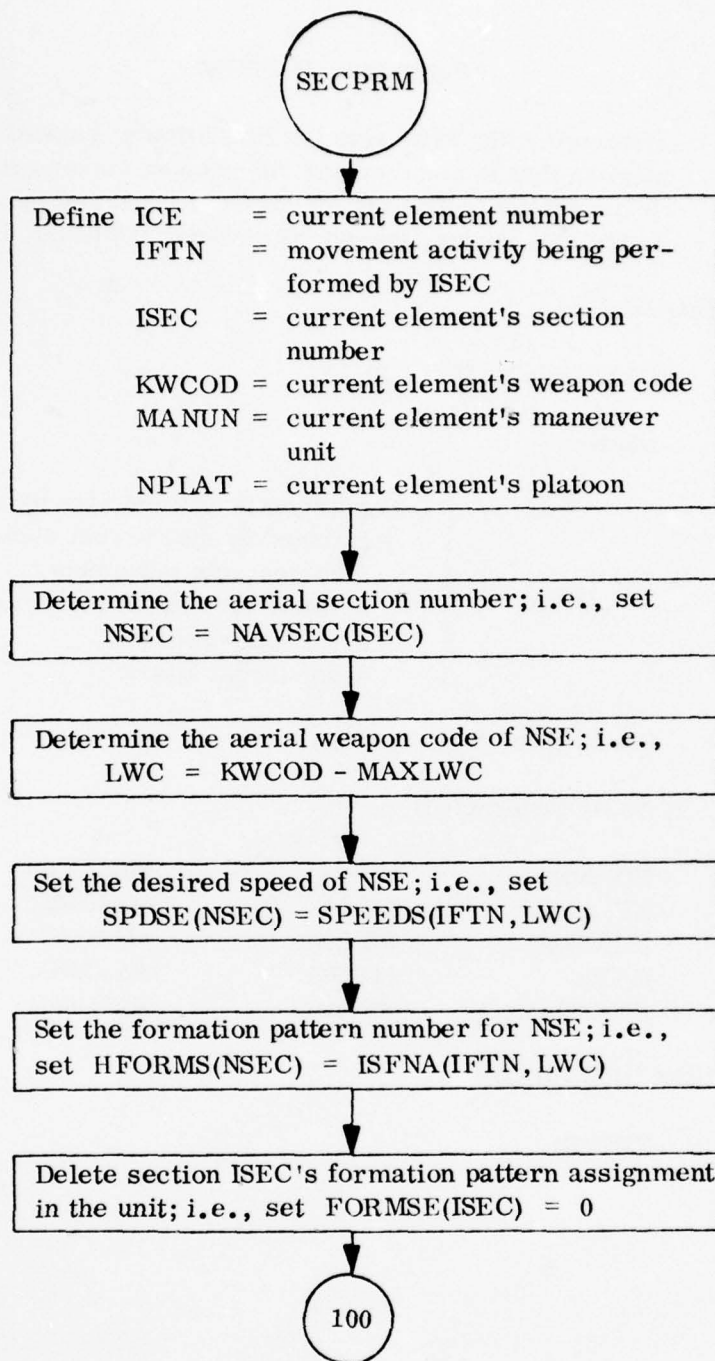
METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

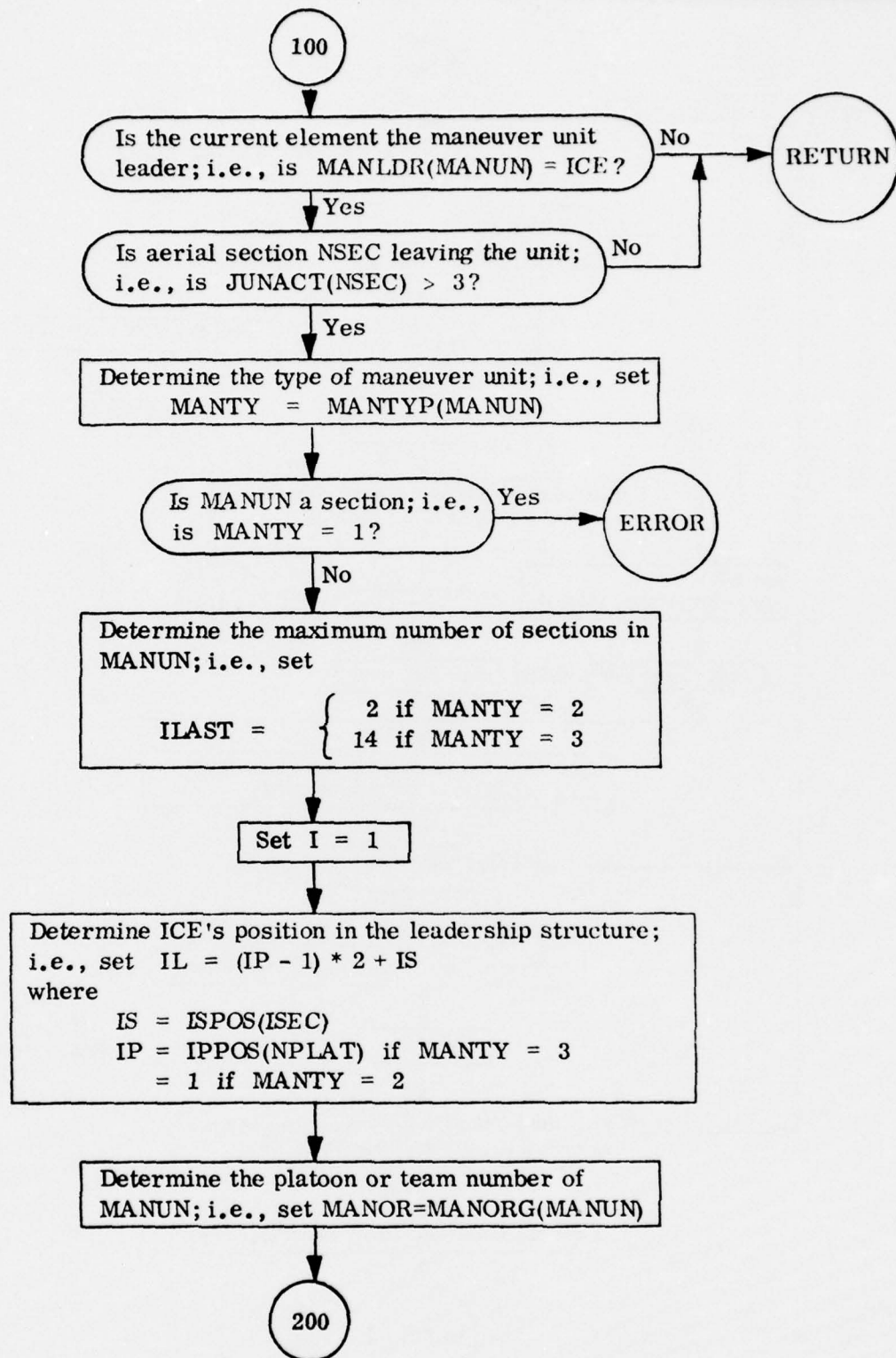
| | | | |
|--------|--------|--------|--------|
| FORMSE | ISFNA | MANLDR | SPDSE |
| HFORMS | ISORG | MANORG | SPEEDS |
| ICECOM | ISPOS | MANTYP | |
| IPORG | ITORG | NAVSEC | |
| IPPOS | JUNACT | NUMBER | |

SUBROUTINES REQUIRED:

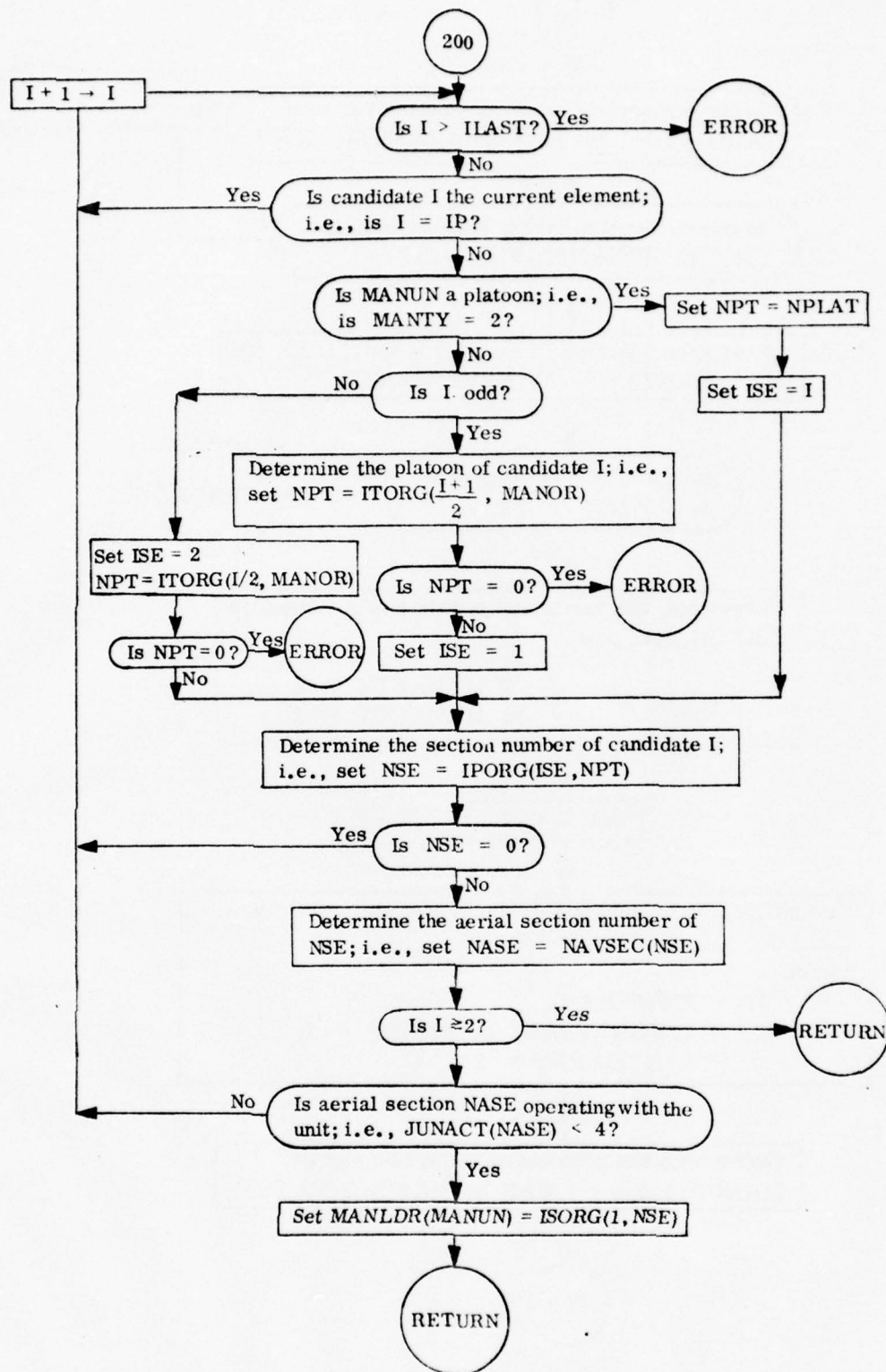
ERROR



Subroutine SECPRM: Setting Aerial Section Movement Parameters and Formation for Independent Movement



Subroutine SECPRM: Continued



Subroutine SECPRM: Continued

B-688

Subroutine SECSET

PURPOSE: Subroutine SECSET performs bookkeeping required when an aerial maneuver unit changes mission assignments.

CALLING SEQUENCE:

CALL SECSET(NAT)

where

NAT = aerial unit being processed

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| DIRMU | IUNACT | NAVSEC |
| EDIR | JUNACT | NTELE |
| ELOCX | KMANU | NUMBER |
| ELOCY | LHICE | NAXIS |
| ELOCZ | LIMOV | OBJX |
| ESPD | LMANU | OBJY |
| HALTDU | LMOVF | SPDMU |
| IPHASE | LWCOD | XD |
| ISORG | MANLDR | YD |

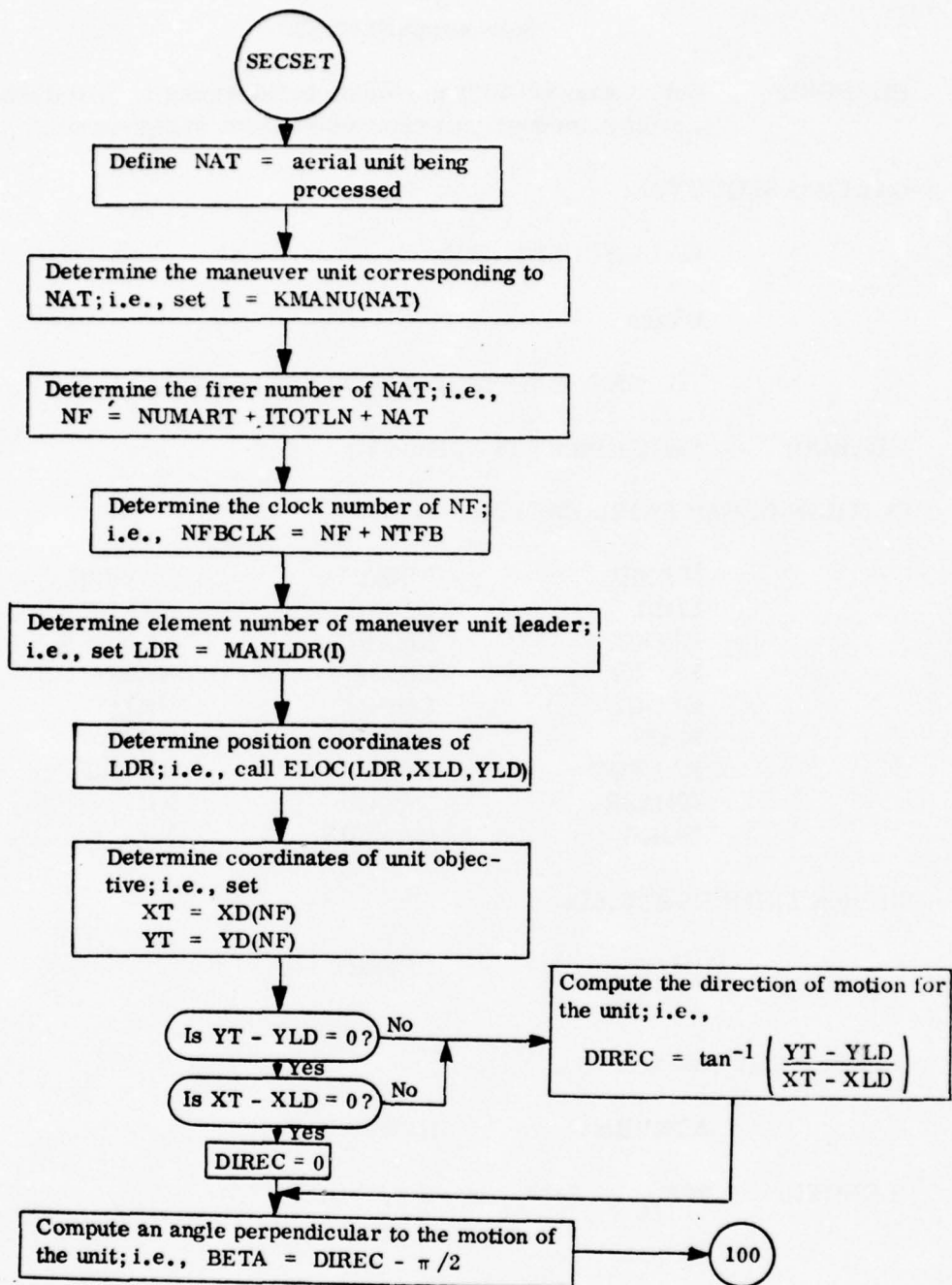
SUBROUTINES REQUIRED:

| | |
|-------|--------|
| ELOC | OFFSET |
| HFORM | |

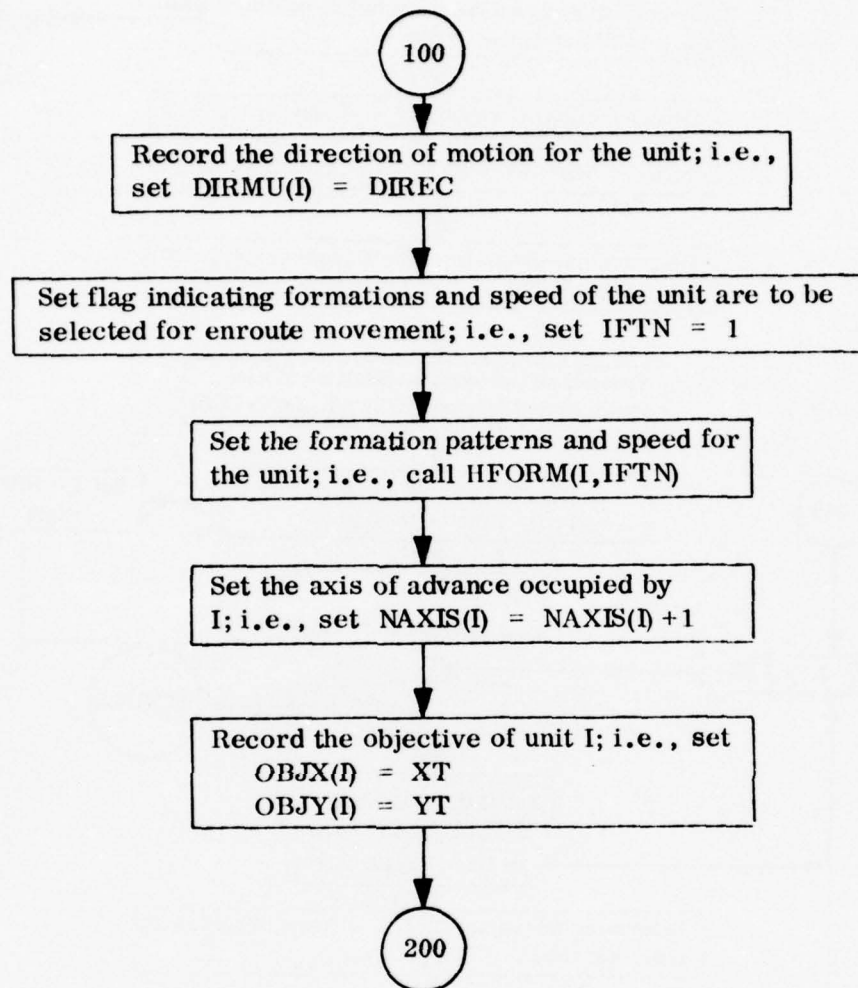
SECSET CALLED BY:

| | |
|--------|--------|
| ATKPRM | NEWMIS |
|--------|--------|

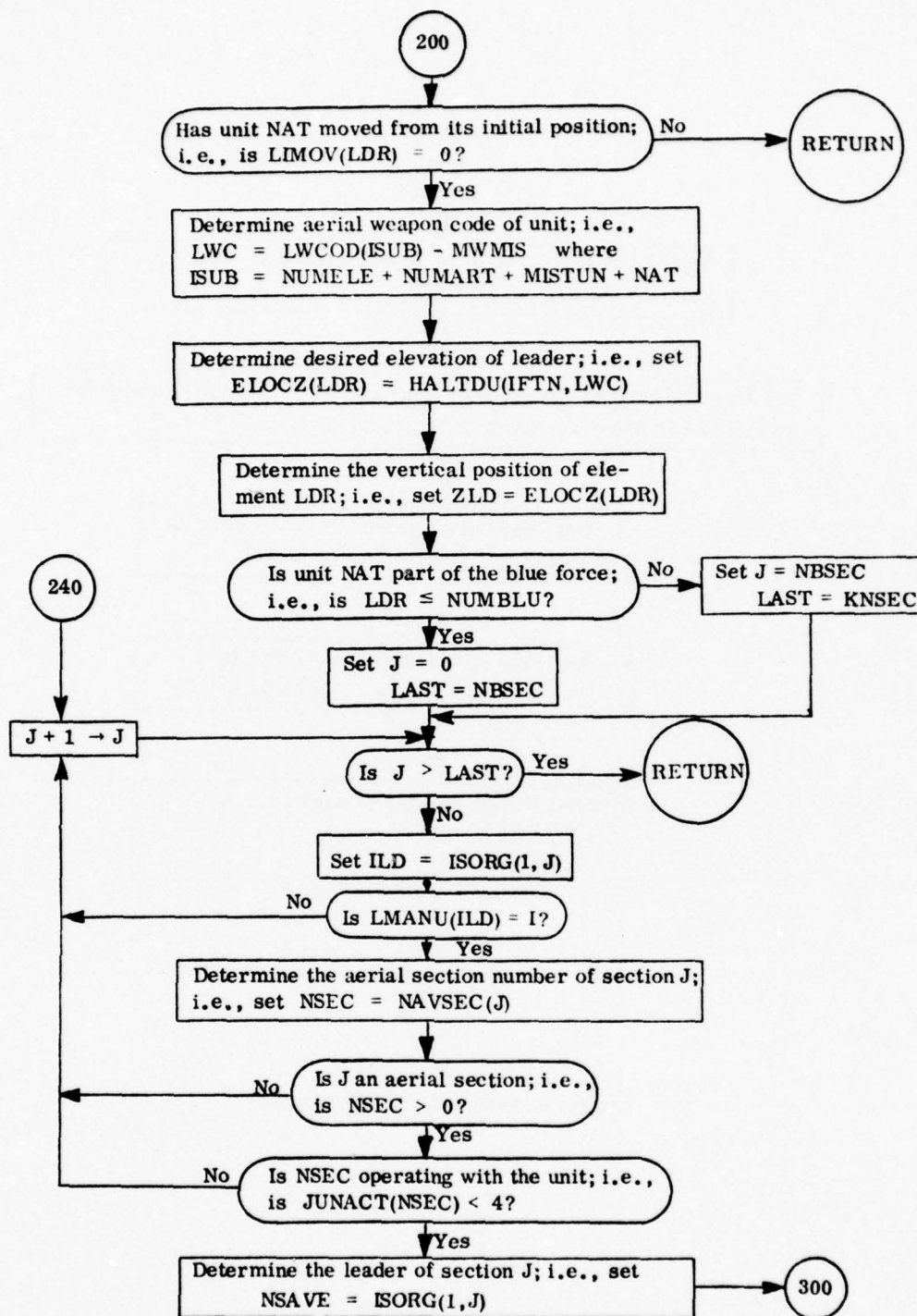
LENGTH: $96E_{16} = 2414_{10}$ bytes



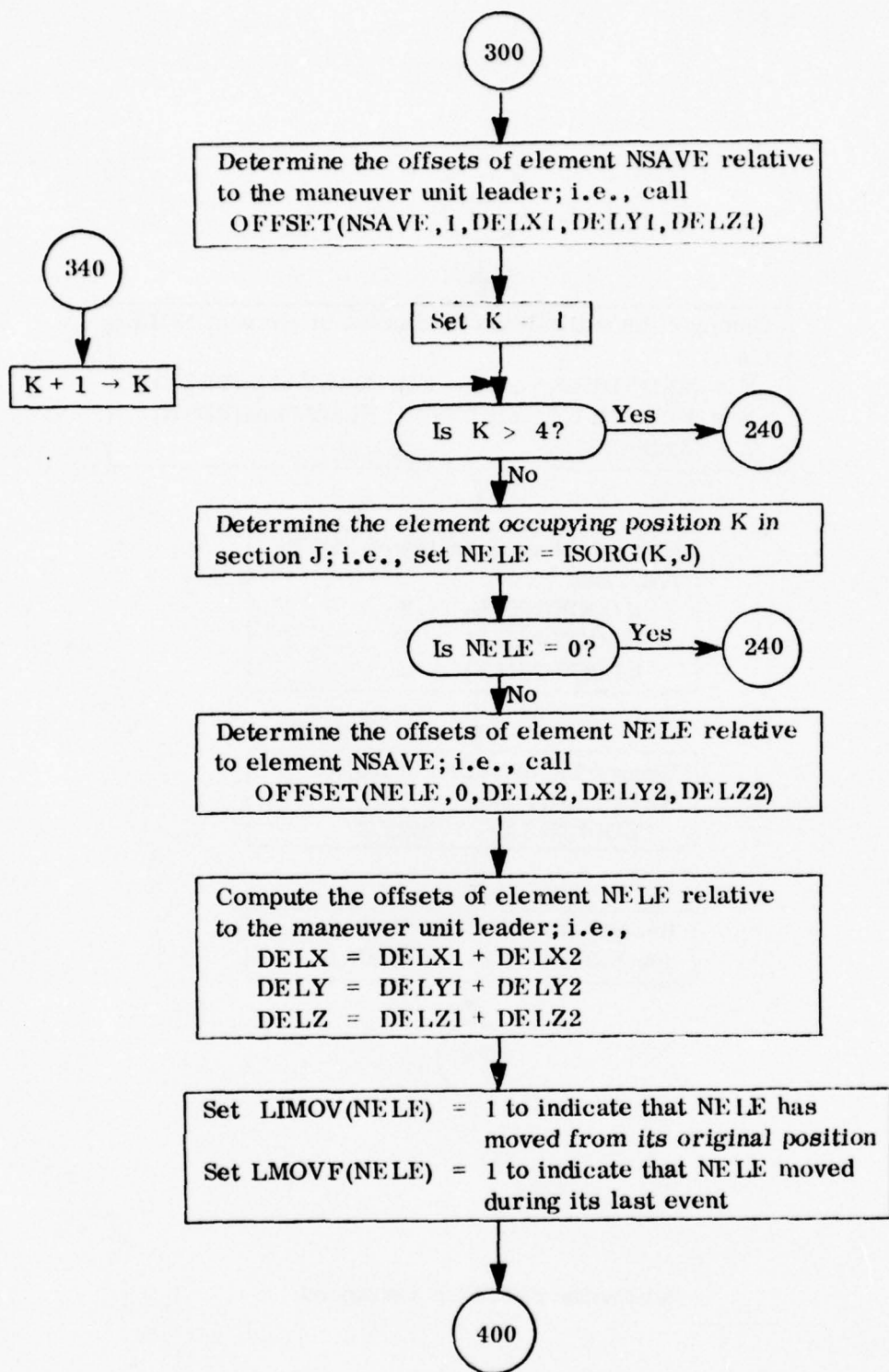
Subroutine SECSET: Setting Movement Parameters for an Aerial Unit



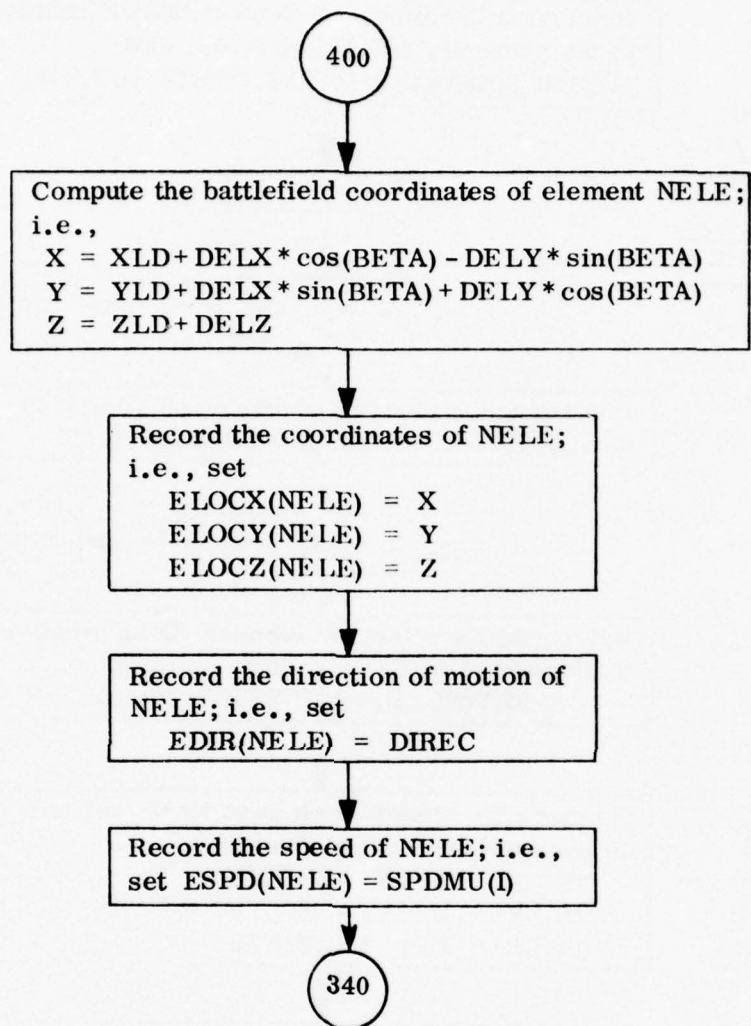
Subroutine SECSET: Continued



Subroutine SECSET: Continued



Subroutine SECSET: Continued



Subroutine SECSET; Continued

Subroutine SEEKER

PURPOSE: Subroutine SEEKER determines whether the target is in the missile's field of view at time T. If so, and if the target moved into the field of view during the flight, a recursive procedure will be initiated to determine the position when the target penetrated the field of view. Both level and ballistic flight missiles are represented.

CALLING SEQUENCE:

CALL SEEKER(NOBRK, ITER1, ITER2, FLP, IGUIDE)

NOBRK is . TRUE. if target had previously been in the field of view.

ITER1 = literal symbols for output (input)

ITER2 = literal symbols for output (input)

FLP = position of forward edge of field of view on previous iteration

IGUIDE = $\left\{ \begin{array}{l} 0 \text{ if target not in field of view, continue search} \\ 1 \text{ if missile flew past the target} \\ 2 \text{ if target is in the field of view} \end{array} \right.$

RESTRICTIONS: None

METHOD: See "Level and Ballistic Flight," Chapter 2 in Volume 1

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| LNSET | OPEN | TVMIS |
| MIDATA | SCANNS | TYPMIS |
| MIFO | | |

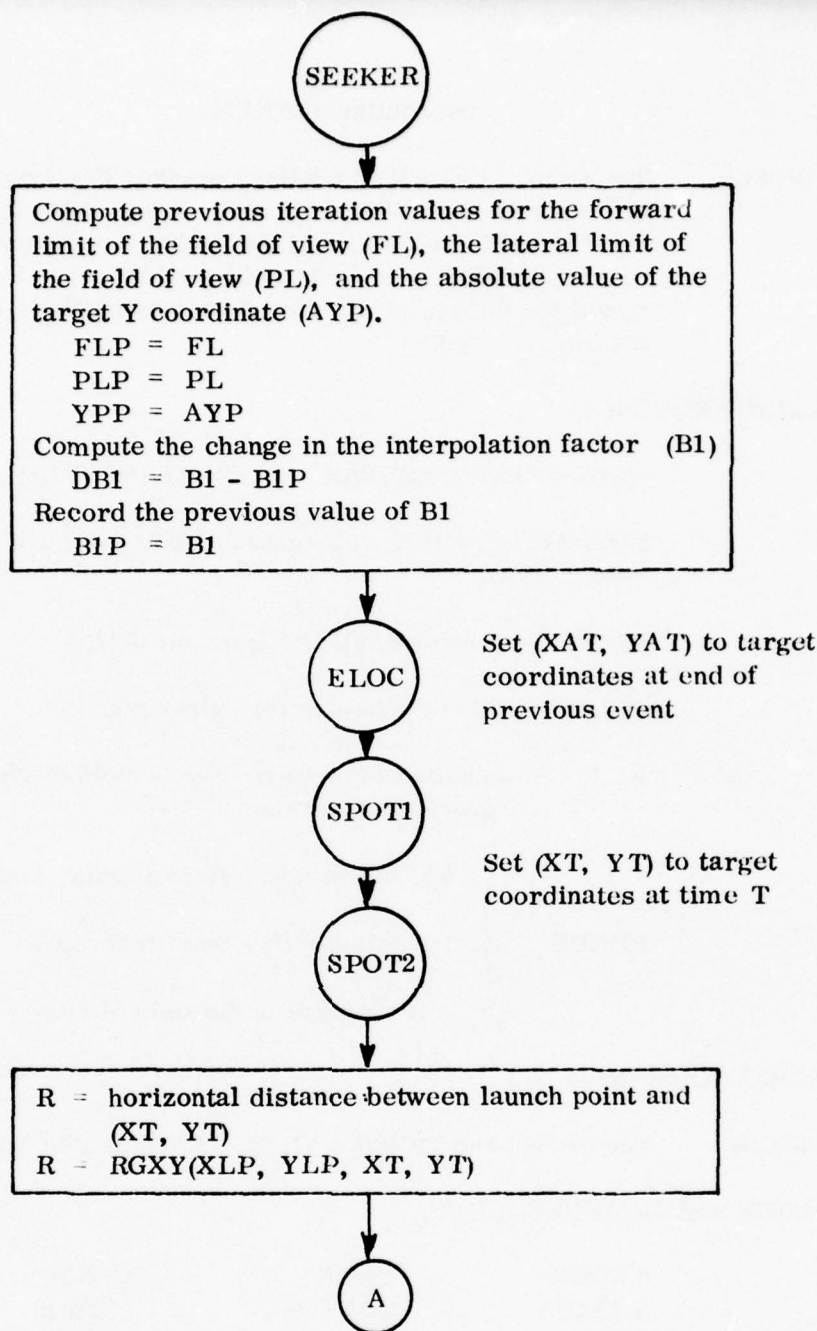
SUBROUTINES USED:

| | | |
|-------|-------|-------|
| ELOC | RGXY | SPOT2 |
| ERROR | SPOT1 | |

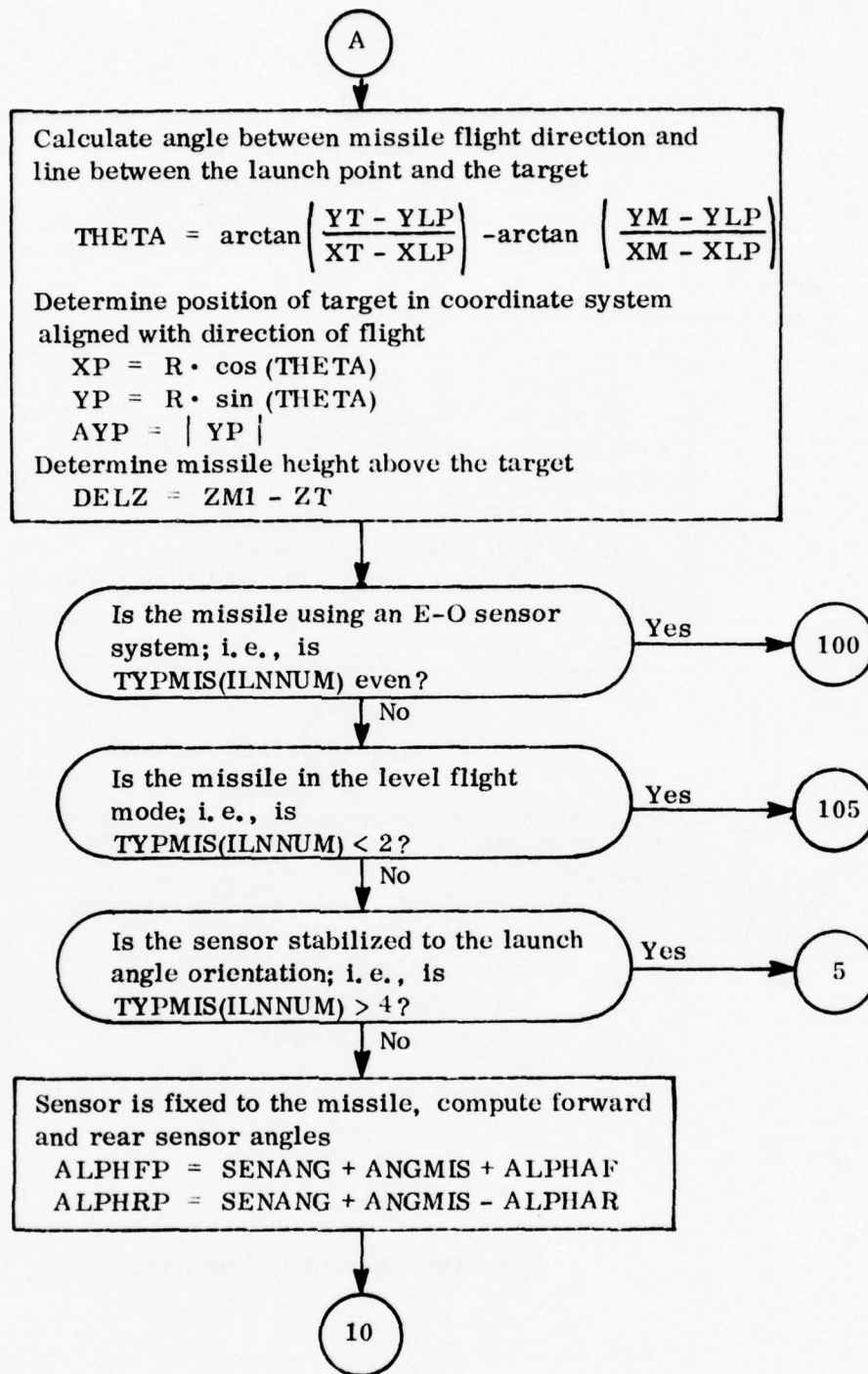
SEEKER CALLED FROM: FLIGHT

STORAGE: 883 words

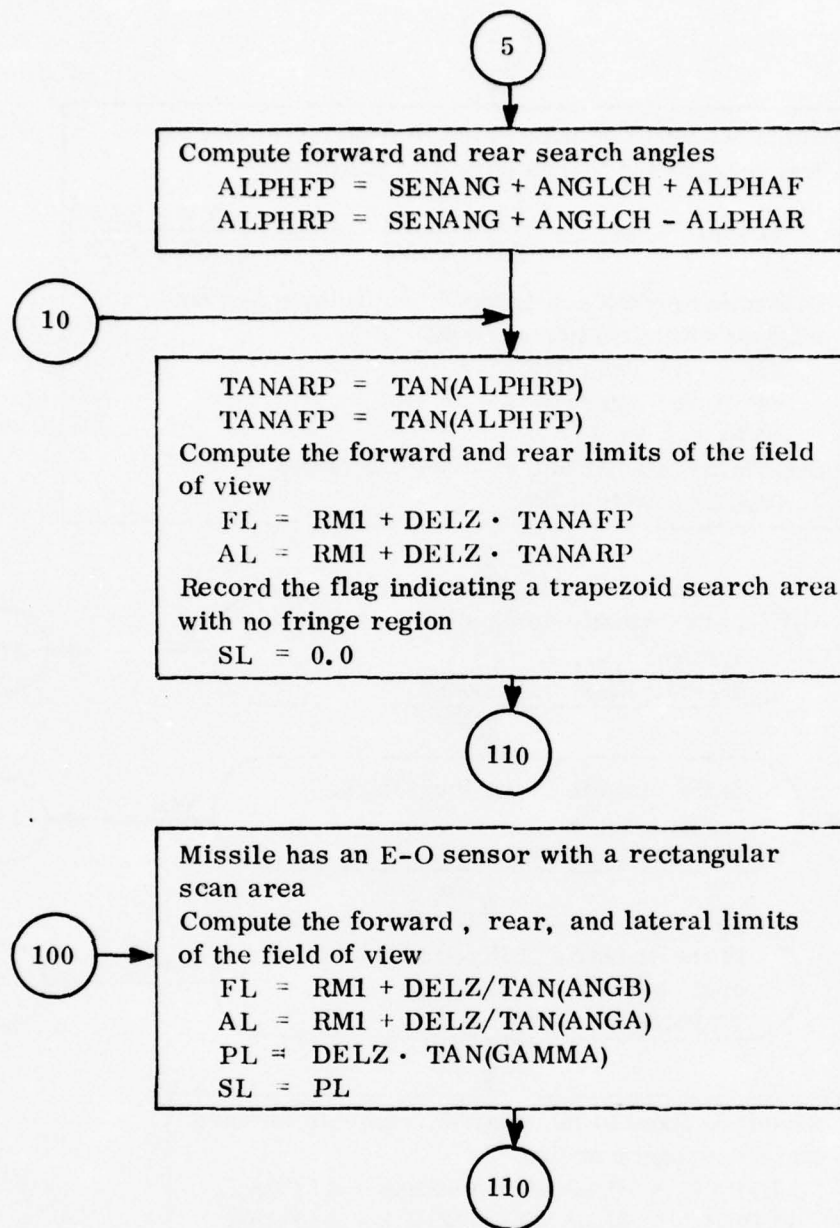
B-695



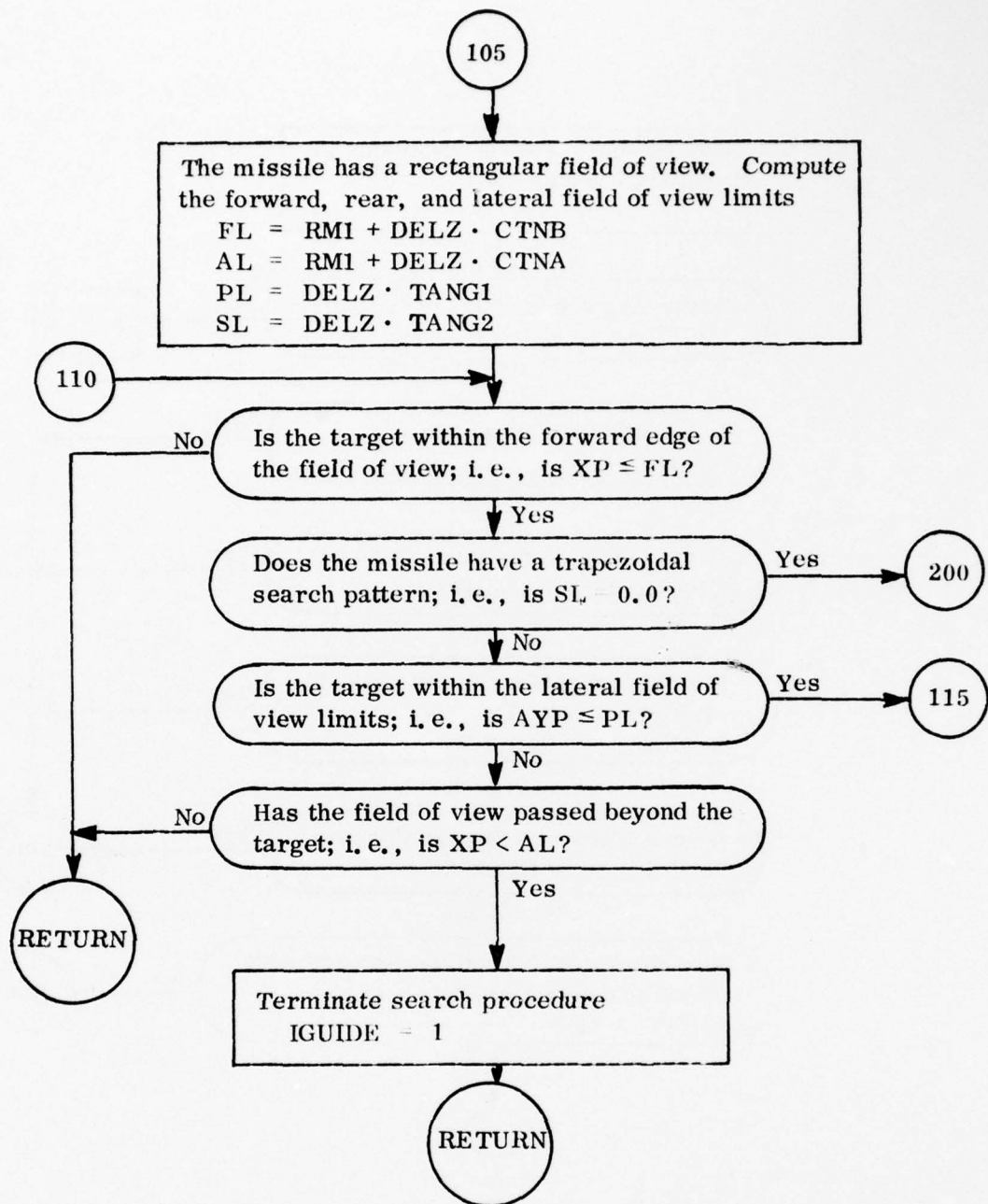
Subroutine SEEKER: Determine whether Target in Field of View



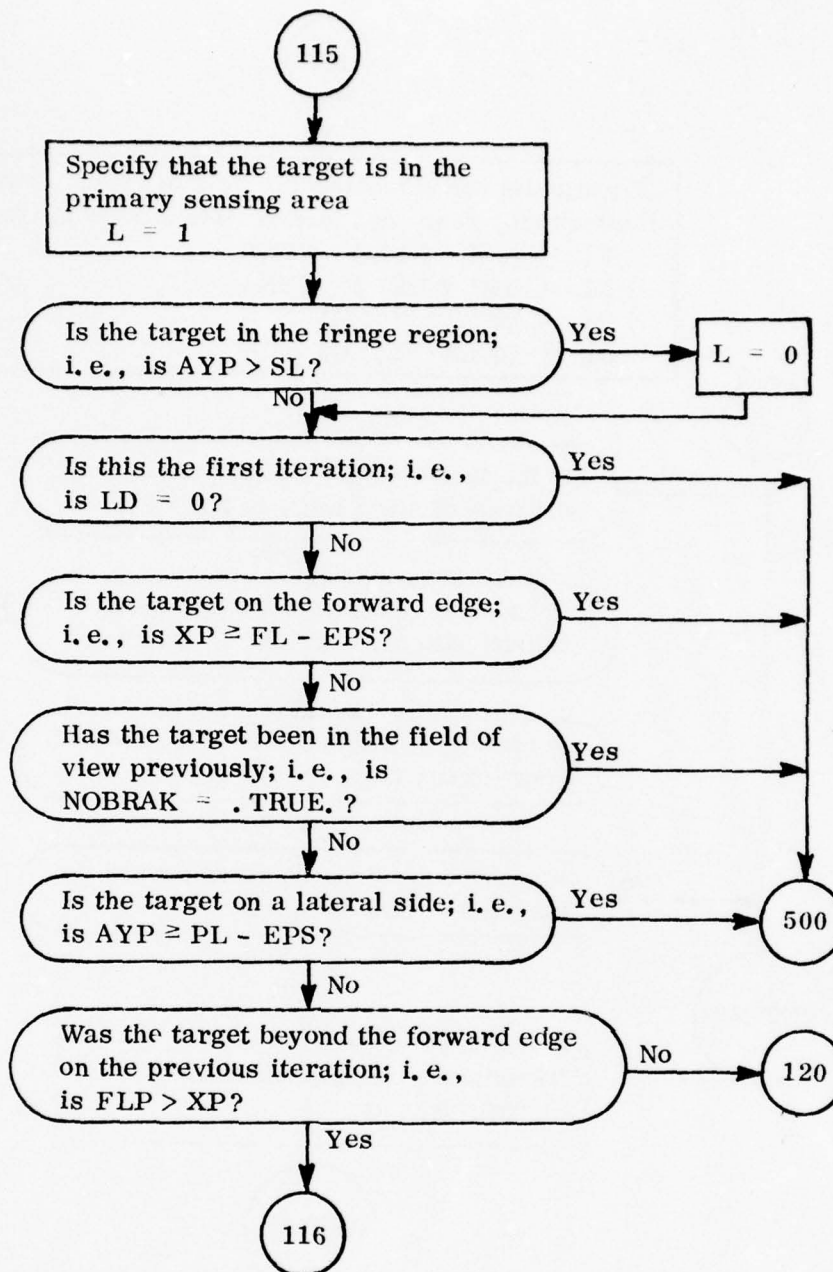
Subroutine SEEKER: Continued



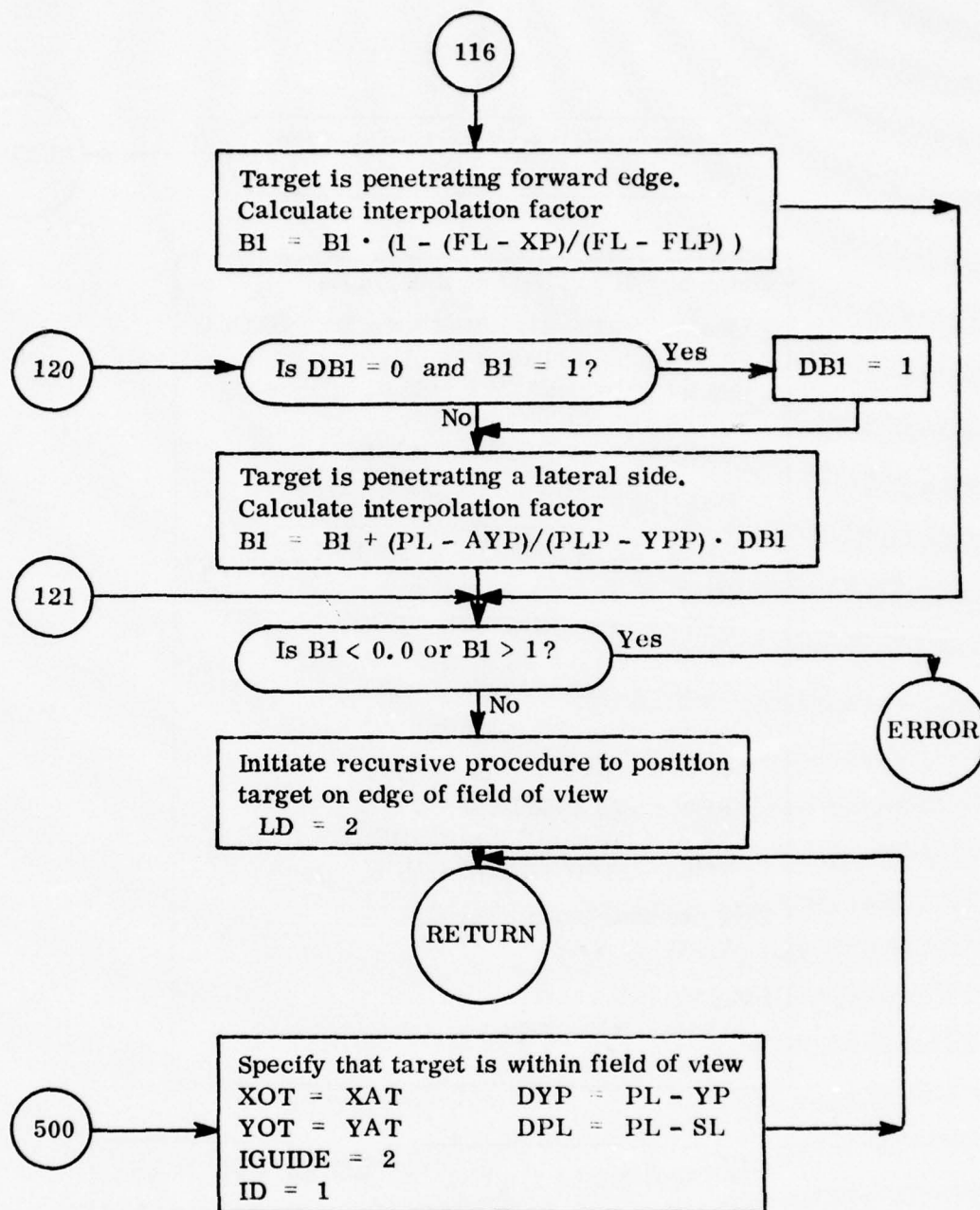
Subroutine SEEKER: Continued



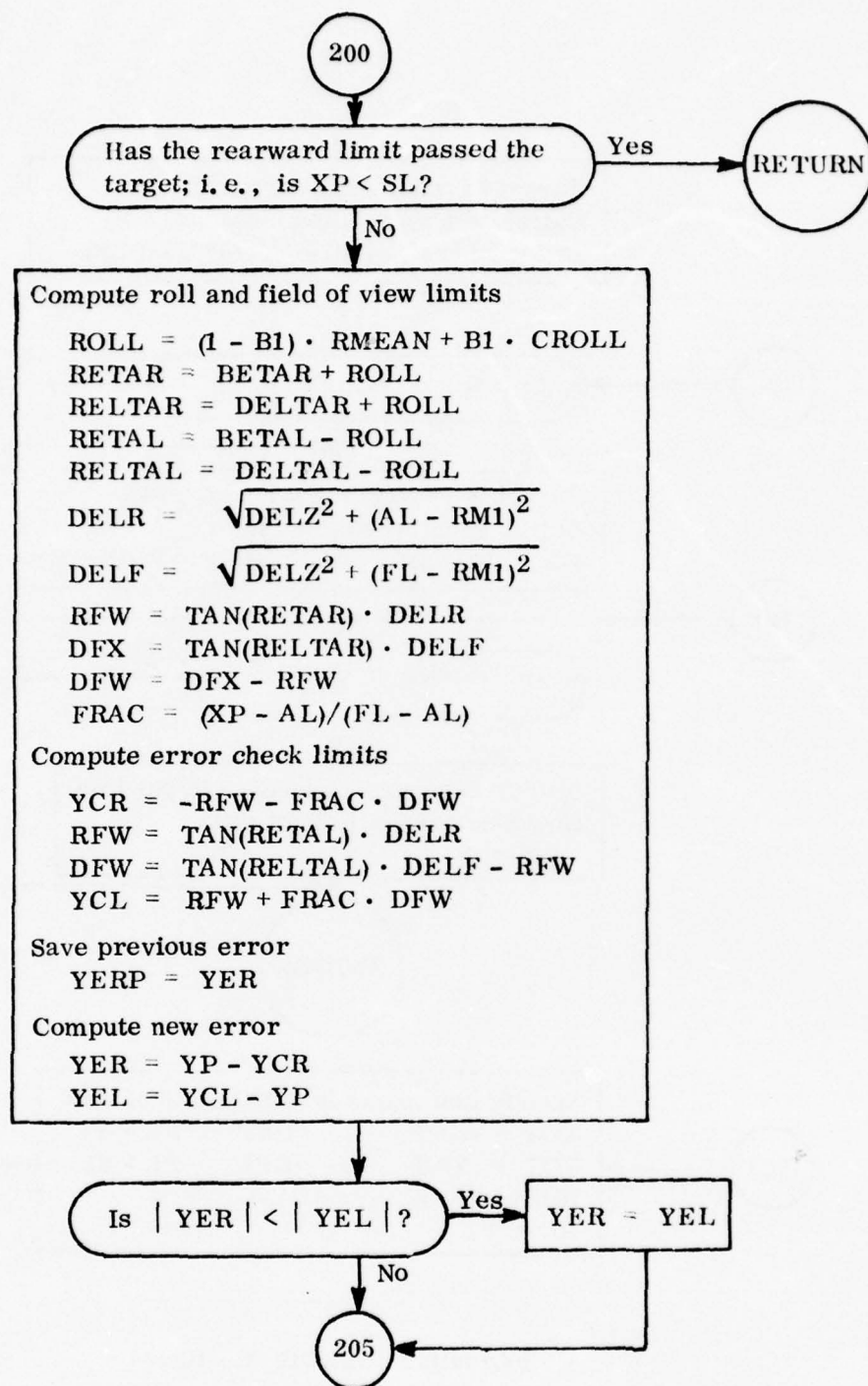
Subroutine SEEKER: Continued



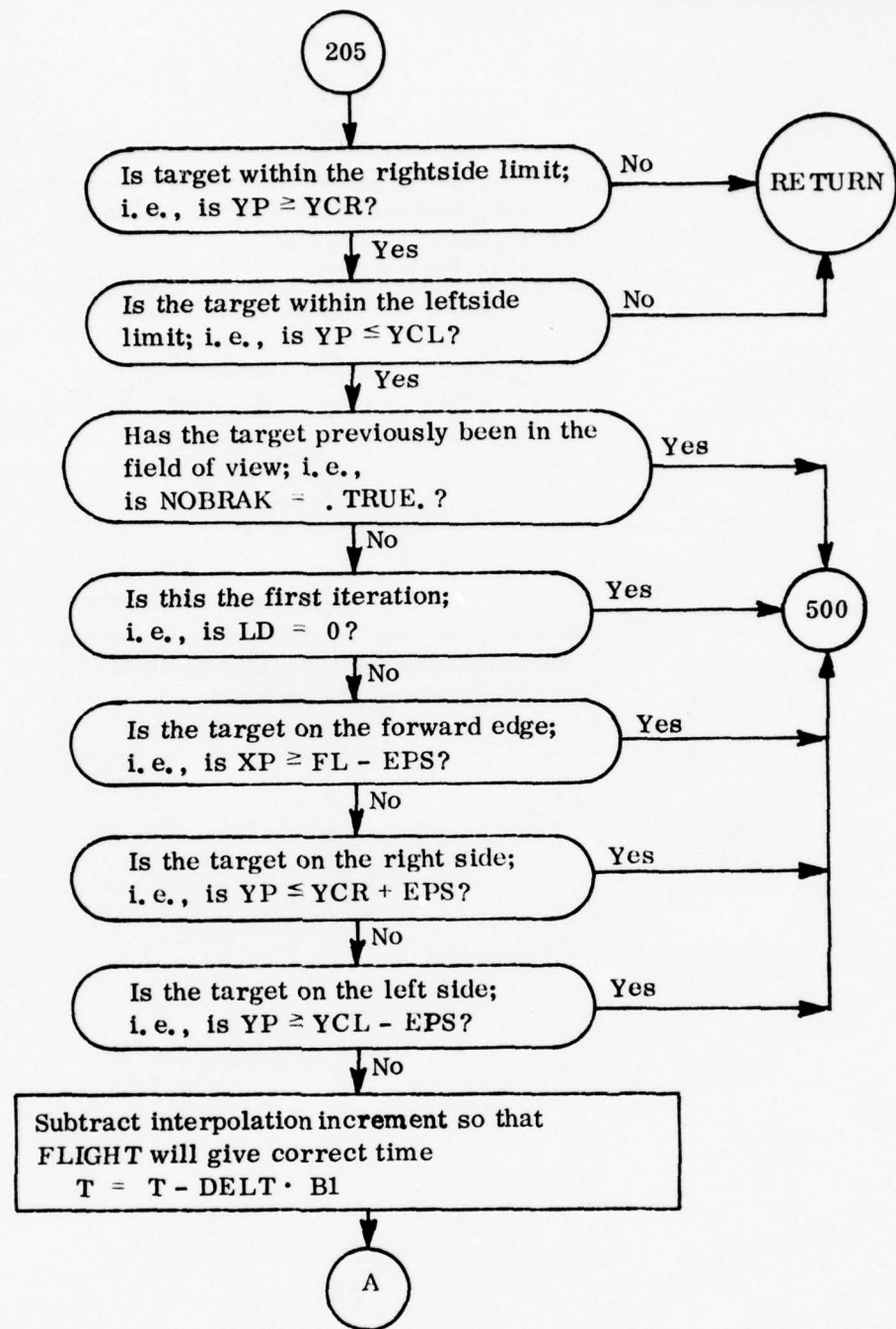
Subroutine SEEKER: Continued



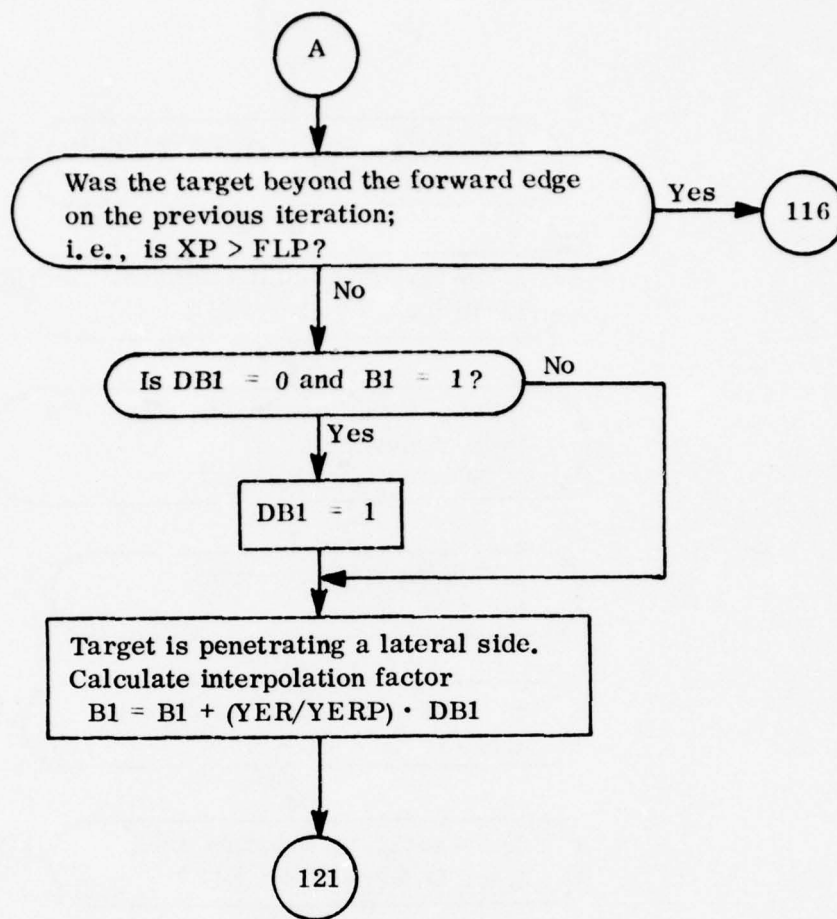
Subroutine SEEKER: Continued



Subroutine SEEKER: Continued



Subroutine SEEKER: Continued



Subroutine SPDASP

PURPOSE: Subroutine SPDASP determines speed, aspect, and range intervals and interpolation factors for interpolation of hit and kill probabilities within the firing model.

CALLING SEQUENCE:

CALL SPDASP(I, J)

where

I = the firer element number

J = the target element number

COMMON AREAS REFERENCED:

EDIR

RANGE

TARSPD

ESPD

SATARG

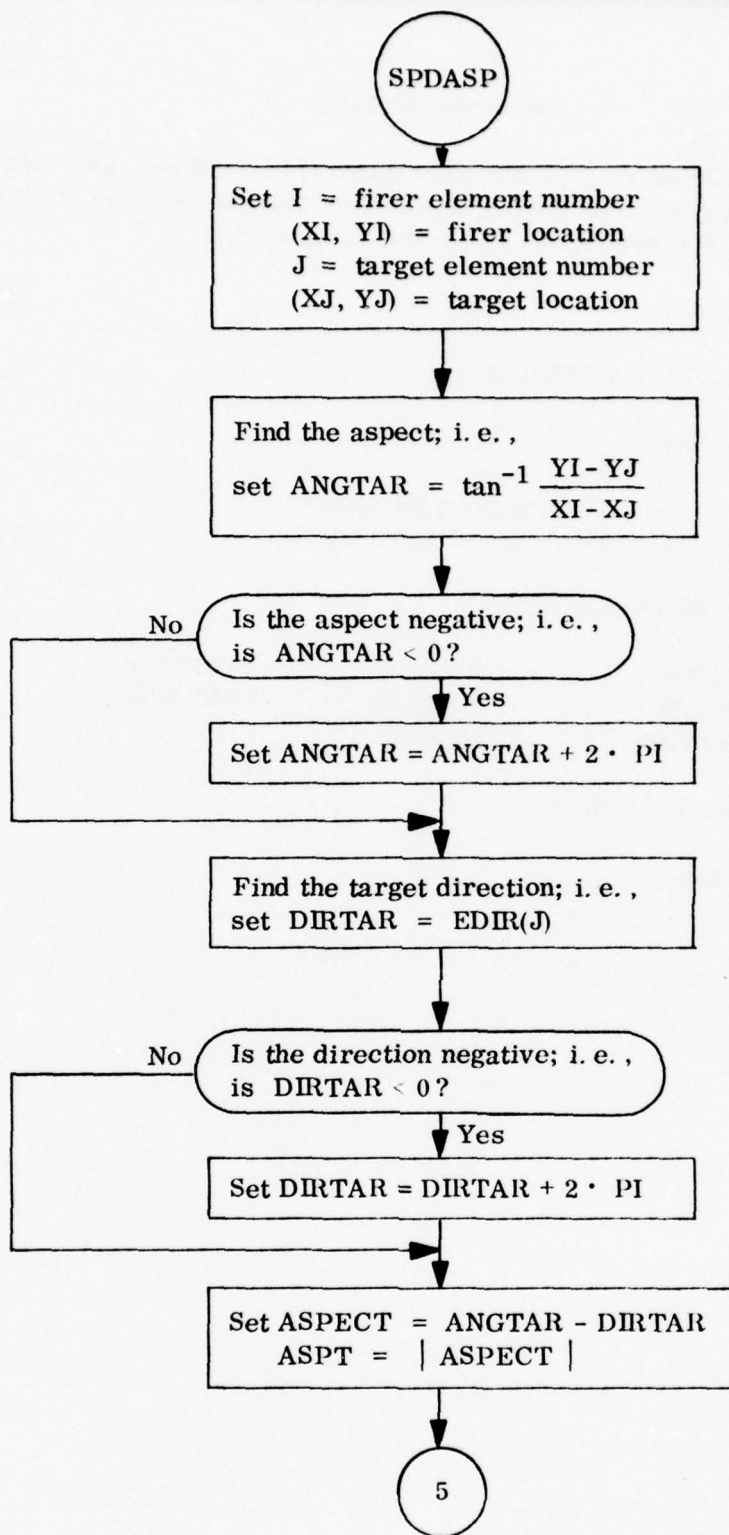
VEHSPD

HPRNG

TARASP

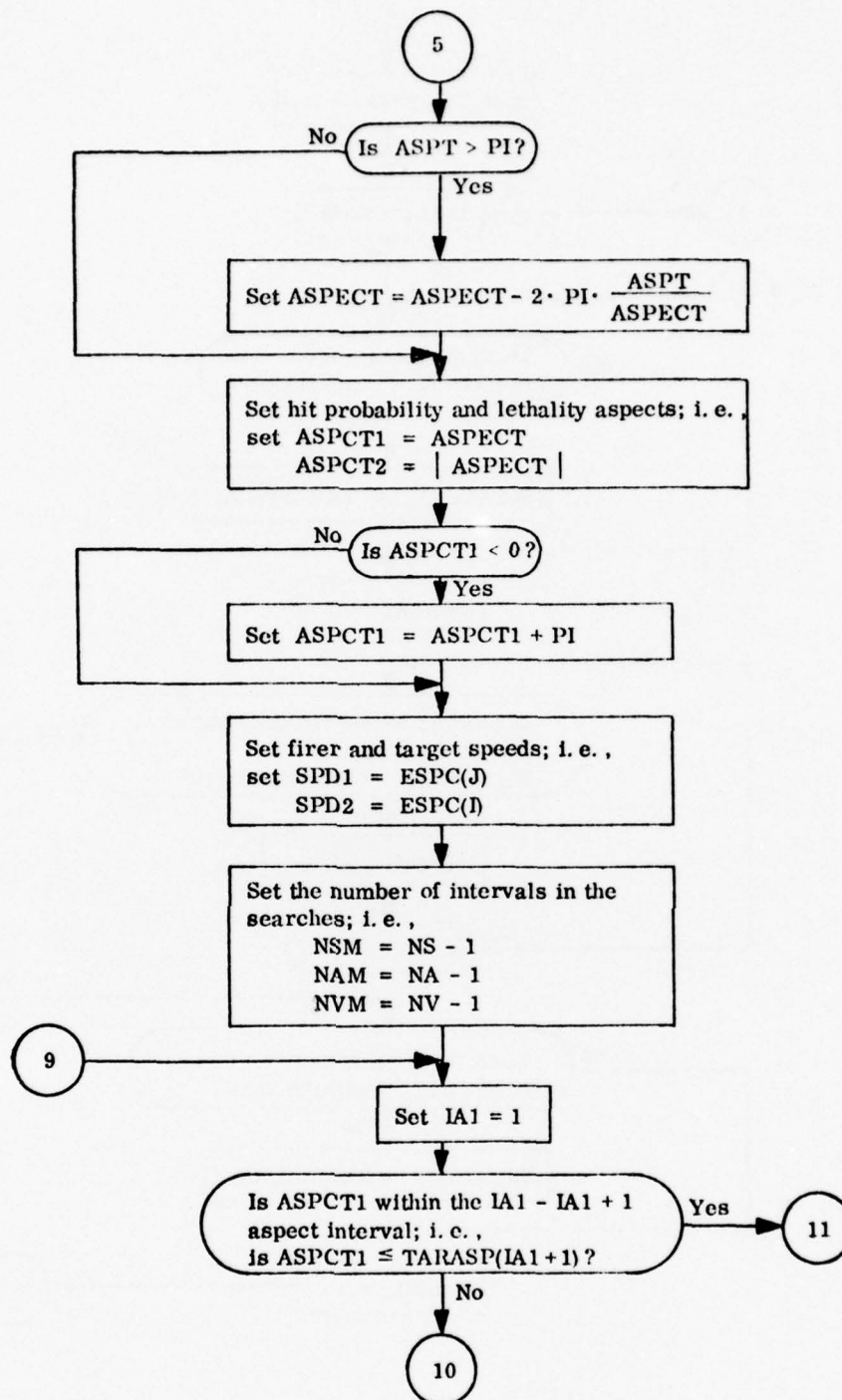
SUBROUTINES REQUIRED:

None

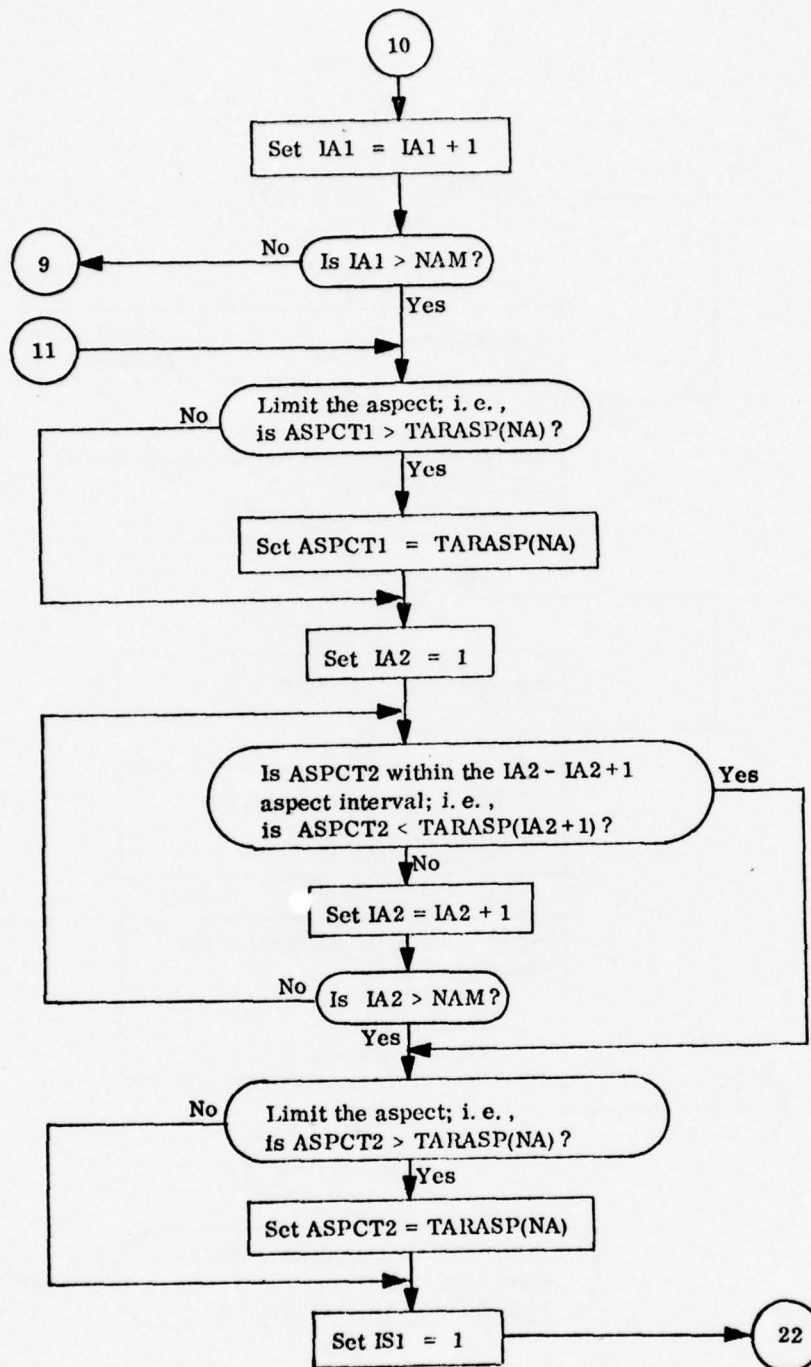


Subroutine SPDASP: Hit and Kill Probability Interpolation Factors

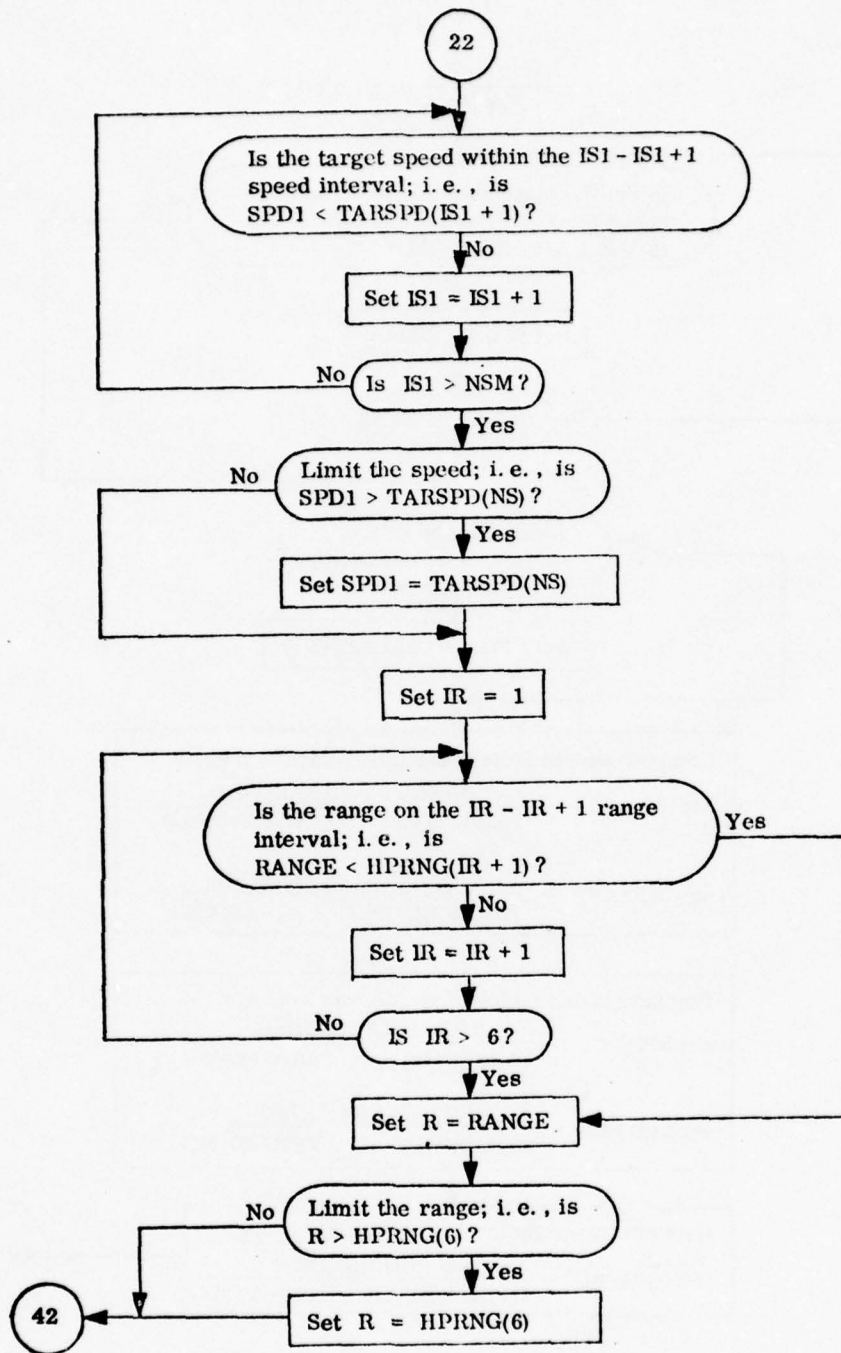
B-706



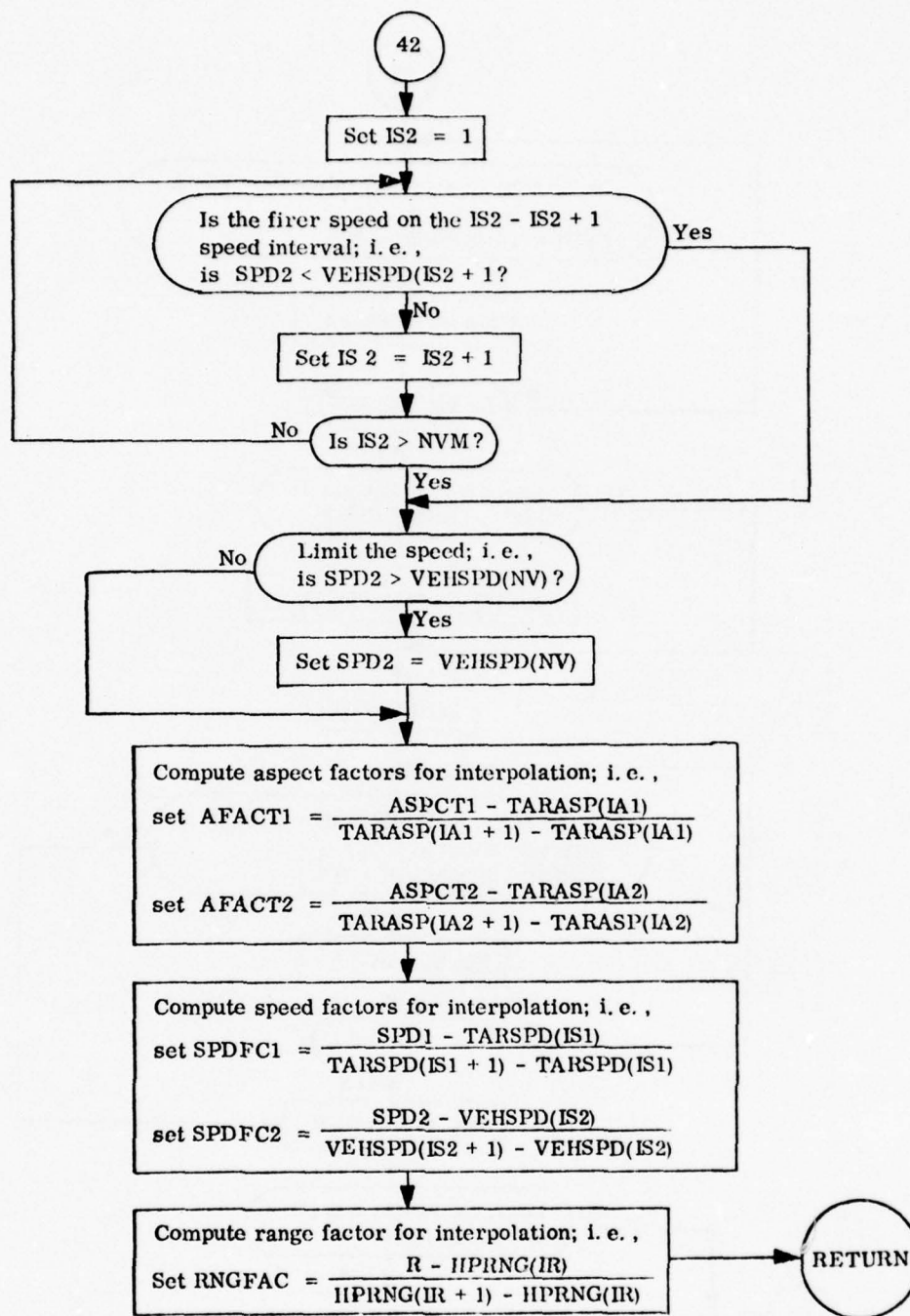
Subroutine SPDASP: Continued



Subroutine SPDASP: Continued



Subroutine SPDASP: Continued



Subroutine SPDASP: Continued

Subroutine STACLK

PURPOSE: Subroutine STACLK is used to set the clocks of elements within an aerial maneuver unit when the unit first becomes active. The fuel supply sections within the unit is also adjusted to reflect consumption while performing the initial movement activity.

CALLING SEQUENCE:

CALL STACLK(NAT)

where

NAT = aerial unit number being processed.

METHOD: See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|--------|--------|--------|
| ECLOCK | LMANU | NTELE |
| ISORG | LWCOD | NUMBER |
| JUNACT | MANLDR | REACT |
| KMANU | NAVSEC | RFUEL |
| | | WFUEL |

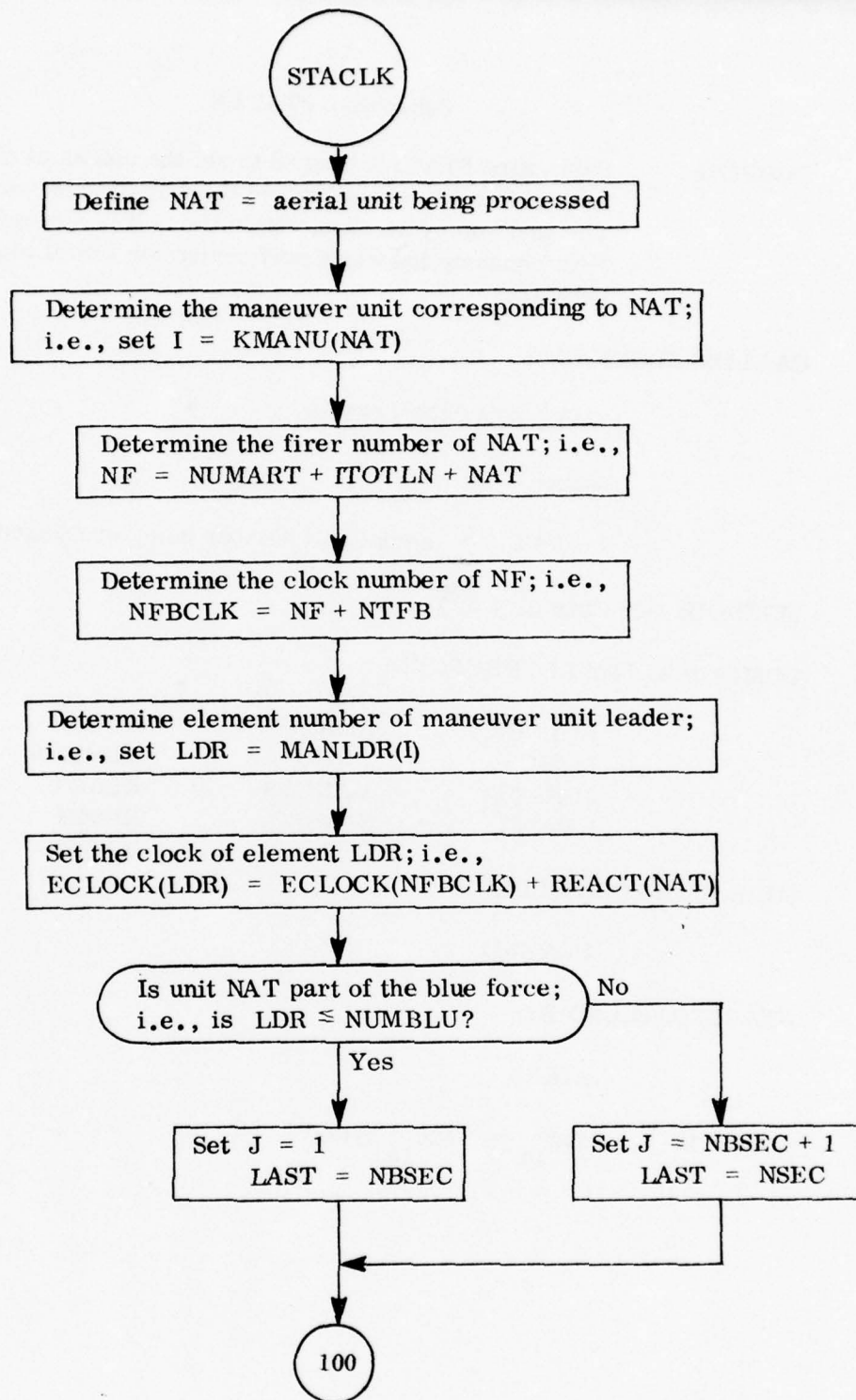
SUBROUTINES REQUIRED:

FRANUD

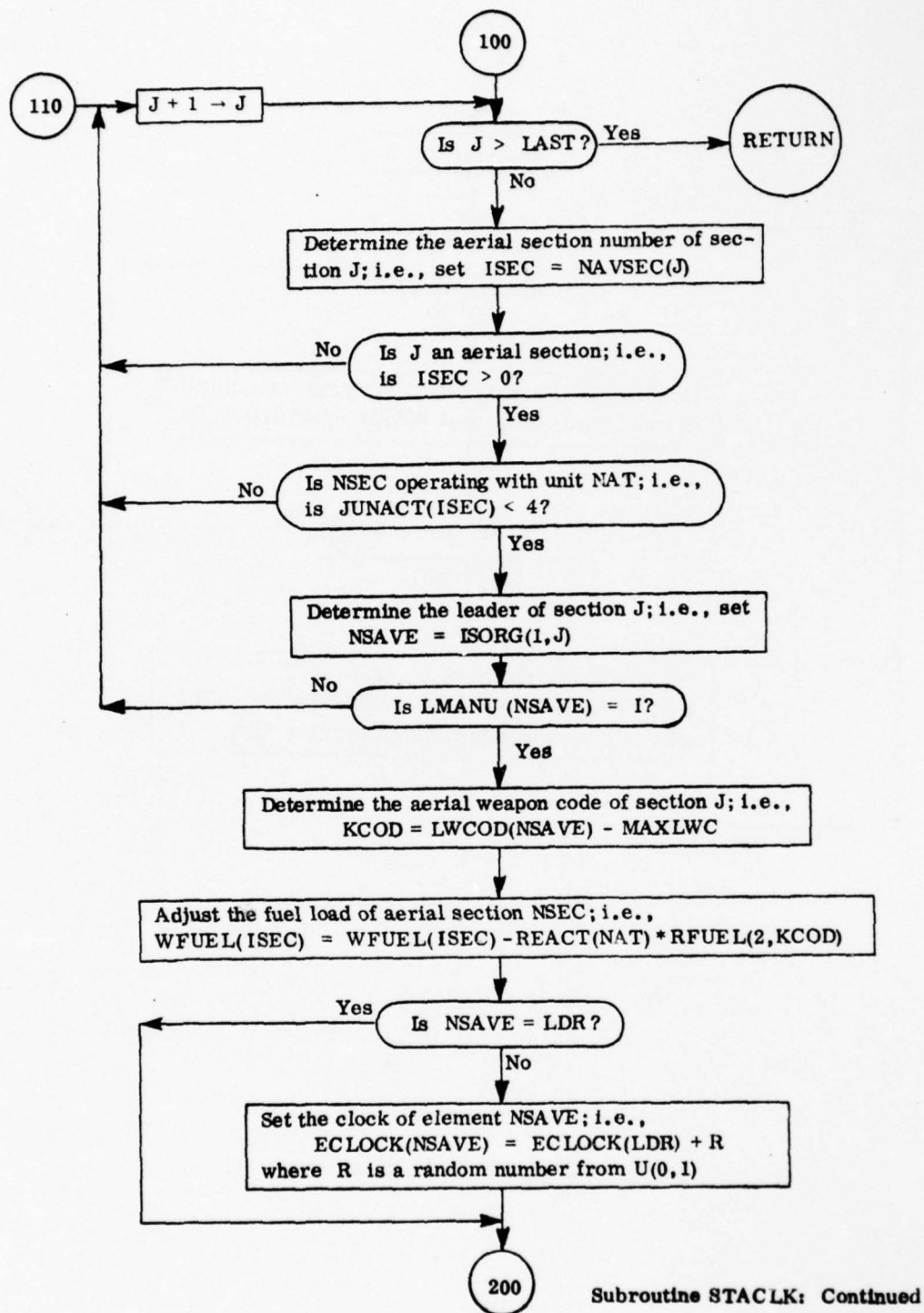
STACLK CALLED BY:

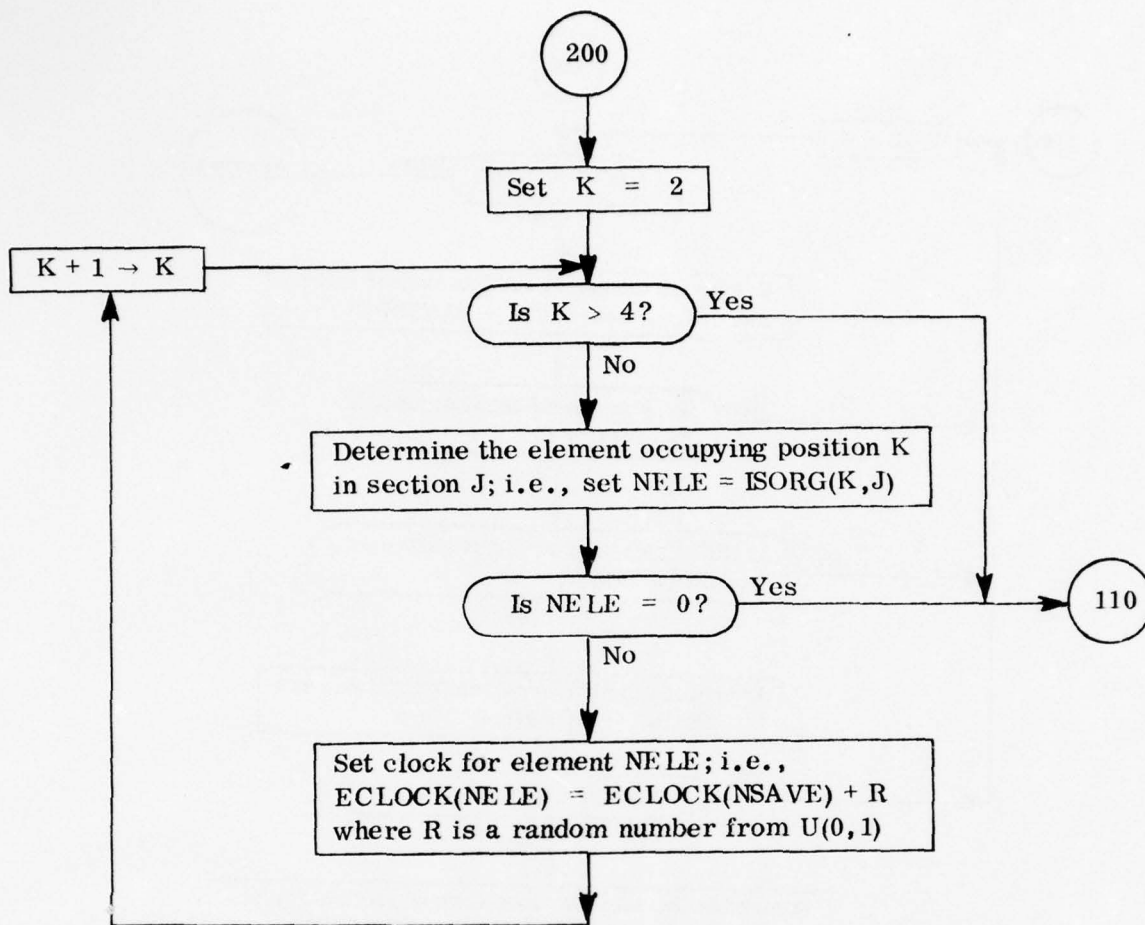
AIRFB

LENGTH: $592_{16} = 1426_{10}$ bytes



Subroutine STACLK: Initializing Helicopter Clocks





Subroutine STACLK: Continued

Subroutine STAXIS

PURPOSE: Subroutine STAXIS initializes axes of advance for an aerial unit that has selected a new mission from the fire-request list.

CALLING SEQUENCE:

CALL STAXIS(NAT)

where

NAT = aerial unit number.

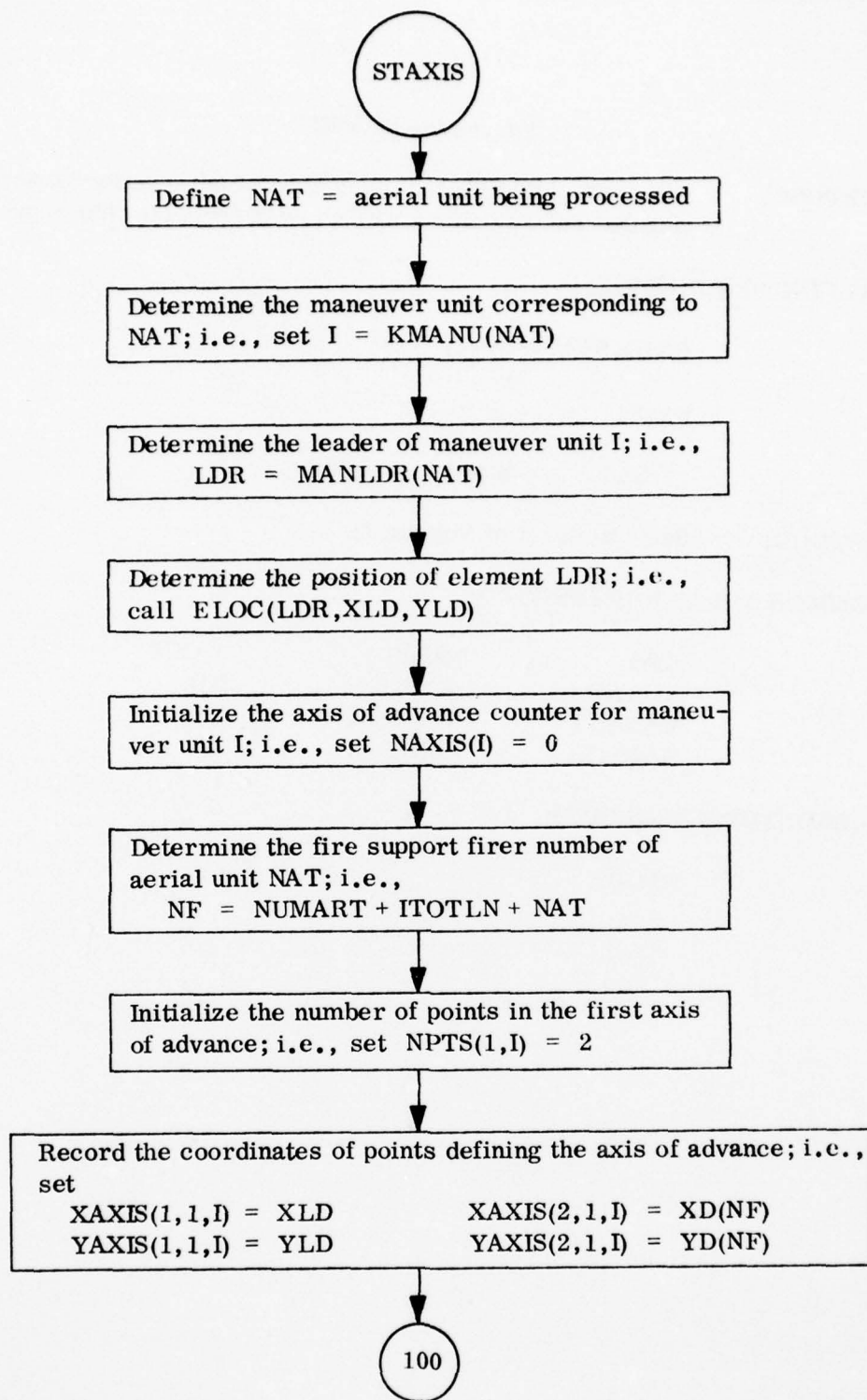
METHOD: See Chapter 4 of Volume 1.

COMMON AREAS REFERENCED:

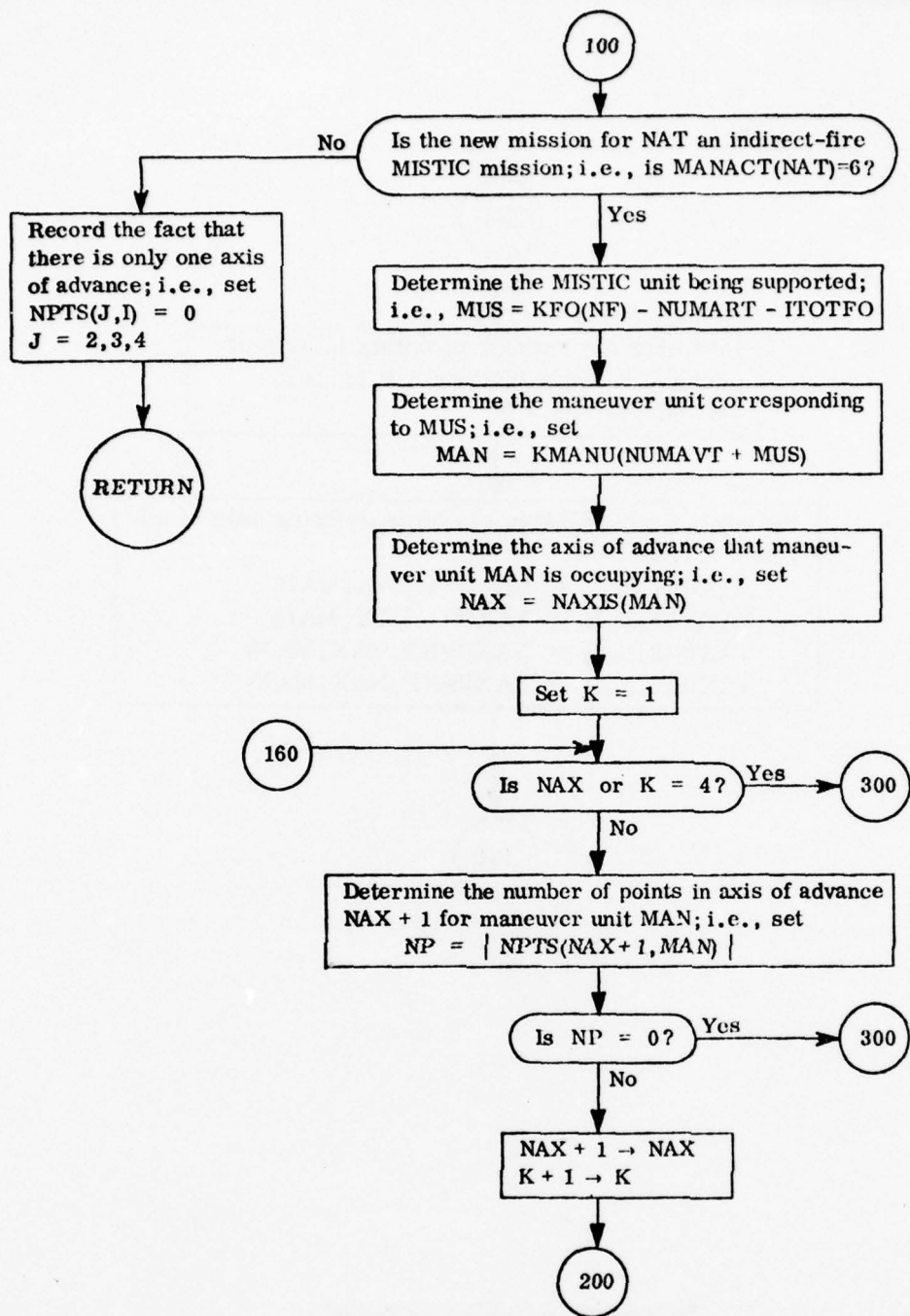
| | | |
|--------|--------|-------|
| KFO | NAXIS | YAXIS |
| KMANU | NPTS | XD |
| MANACT | NUMBER | YD |
| MANLDR | XAXIS | |

SUBROUTINES REQUIRED:

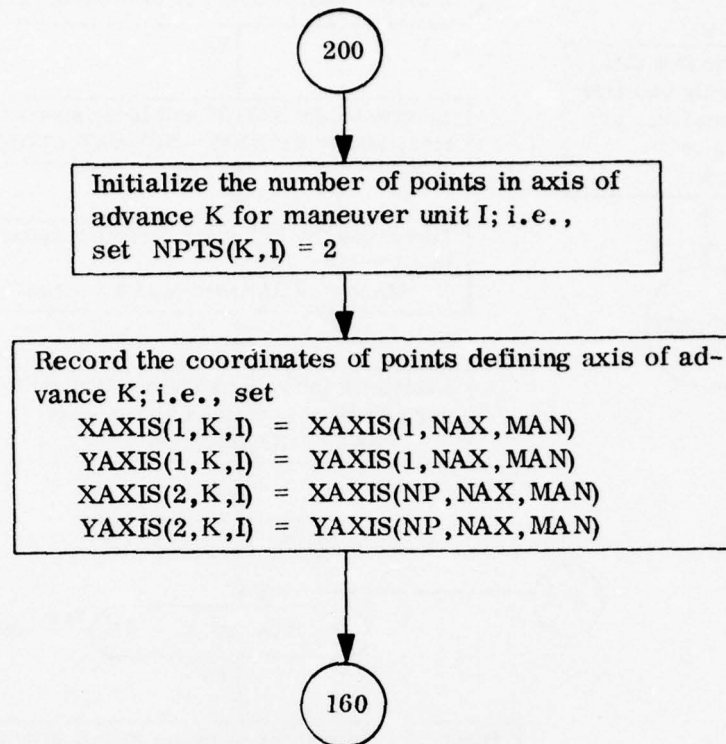
ELOC



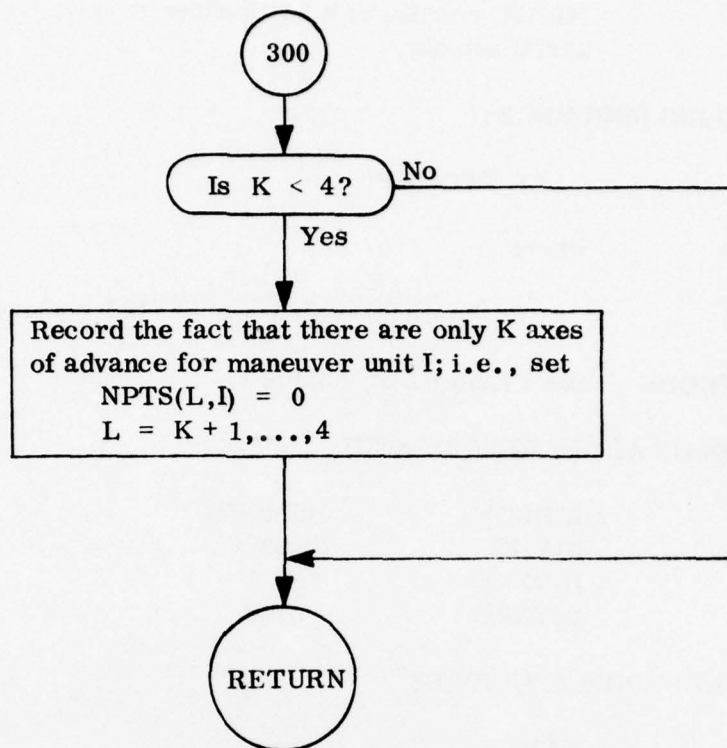
Subroutine STAXIS: Initializing Helicopter Axes of Advance



Subroutine STAXIS: Continued



Subroutine STAXIS: Continued



Subroutine STAXIS: Continued

Subroutine TFCOMP

PURPOSE: Subroutine TFCOMP computes the time required to prepare a MISTIC missile or a beam-rider missile for launch from an aerial vehicle.

CALLING SEQUENCE:

CALL TFCOMP(I)

where

I = aerial vehicle number being processed.

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

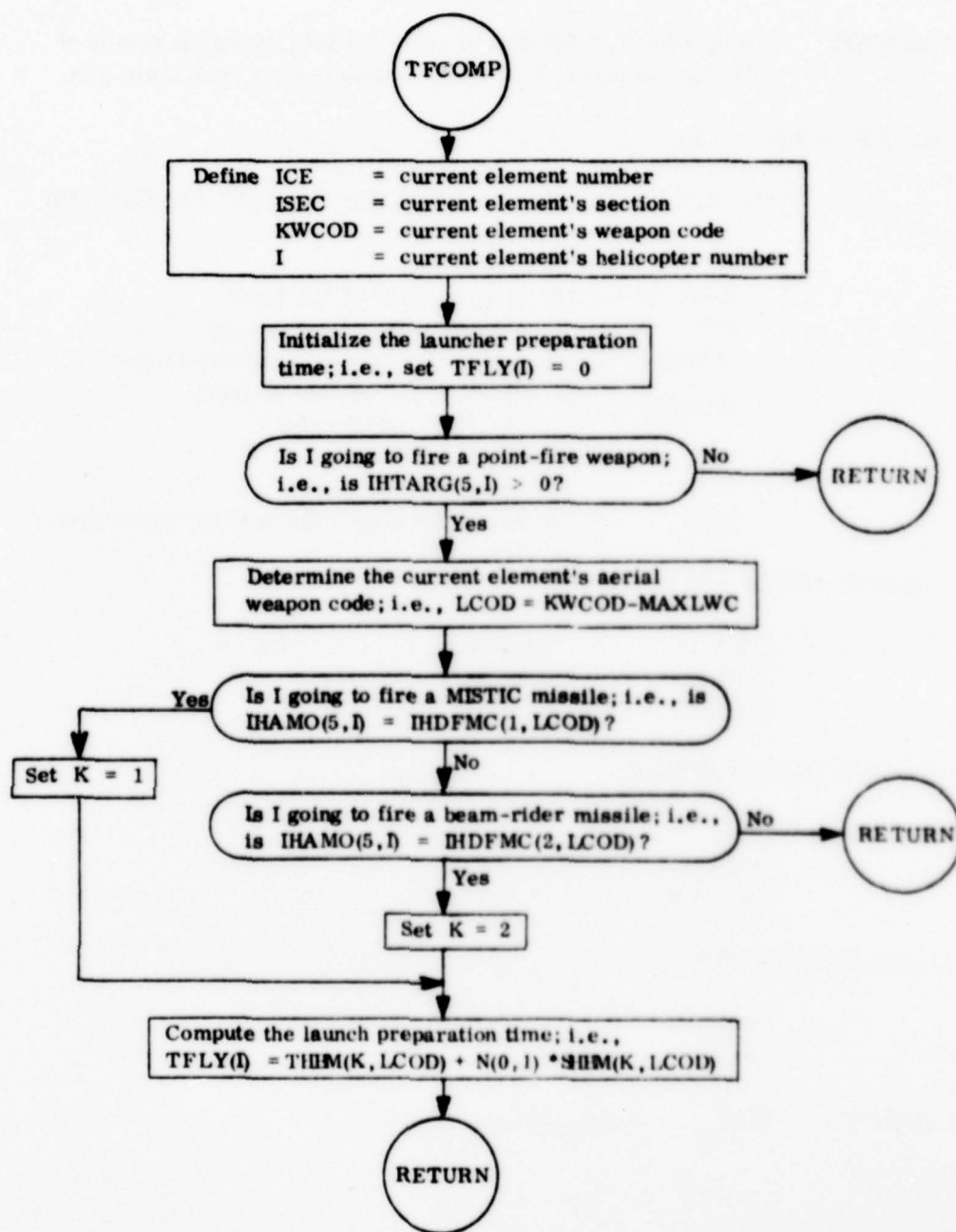
| | |
|--------|--------|
| ICECOM | NUMBER |
| IHAMO | SHBM |
| IHDFMC | TFLY |
| IHTARG | THBM |

SUBROUTINES REQUIRED:

RANND

TFCOMP CALLED BY:

ATKPRM



Subroutine TFCOMP: Computing the Launch Preparation Times
for Aerial Section Members

Subroutine TLETH

PURPOSE: Subroutine TLETH determines the lethality as a result of a firing event for a rapid fire weapon or a tank main gun.

CALLING SEQUENCE:

CALL TLETH(IFWCOD, ITWCOD, ITWSYS, LAMMO, PH,
KILL, IHIT)

IFWCOD = the weapon code of the firer
ITWCOD = the weapon code of the target
ITWSYS = the weapon system code of the target
LAMMO = { . TRUE. - rapid fire weapon
 . FALSE. - otherwise
PH = the hit probability
KILL = the returned kill type
IHIT = the hit-no hit flag (returned for rapid fire).

COMMON AREAS REFERENCED:

| | | |
|--------|--------|------|
| FIRKON | MAXWEP | PKPB |
| HPRNG | RANGE | |
| LAMMO | TPMKH | |

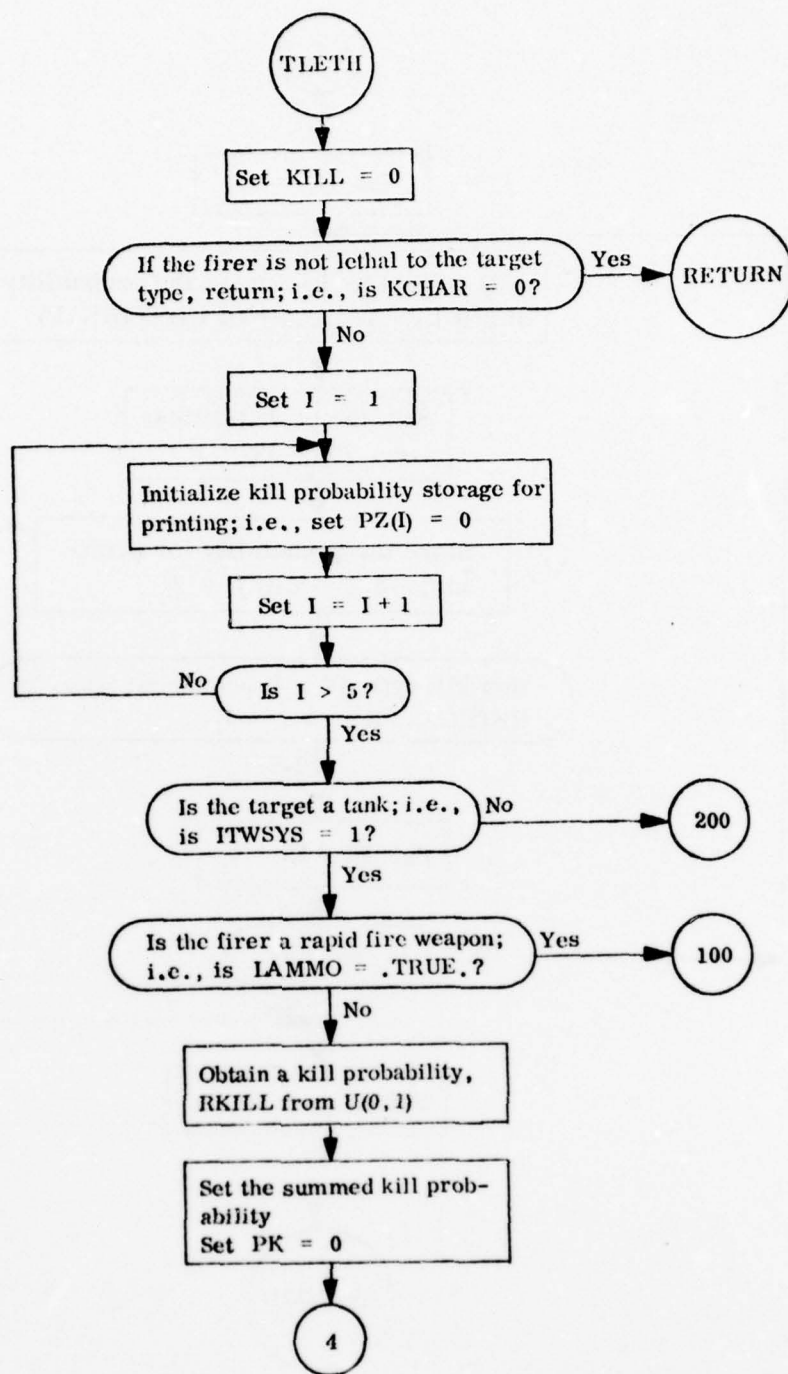
SUBROUTINES REQUIRED:

DDSX
DDSX4
FRANUD

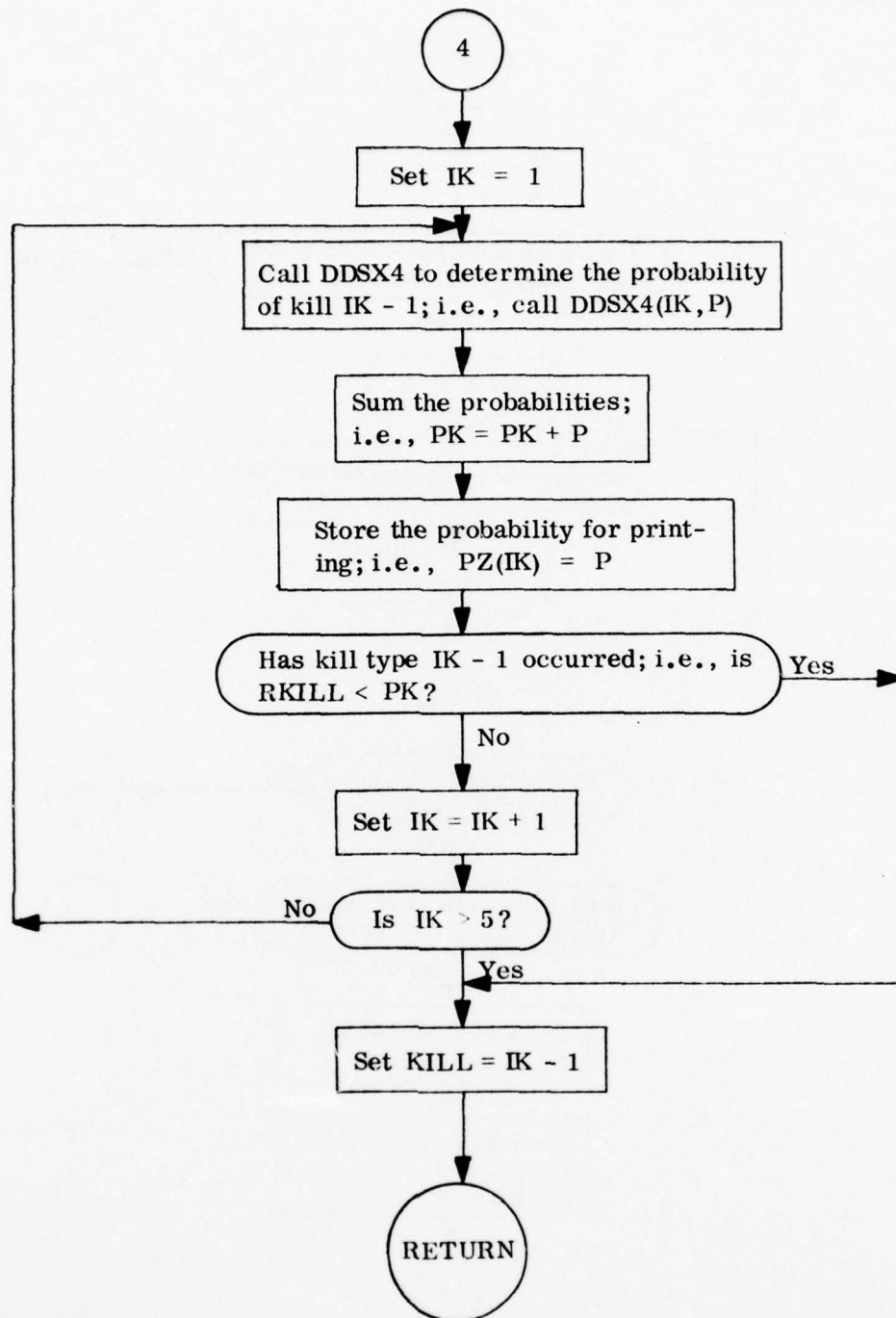
TLETH CALLED BY:

FIRMOD
HFIRE

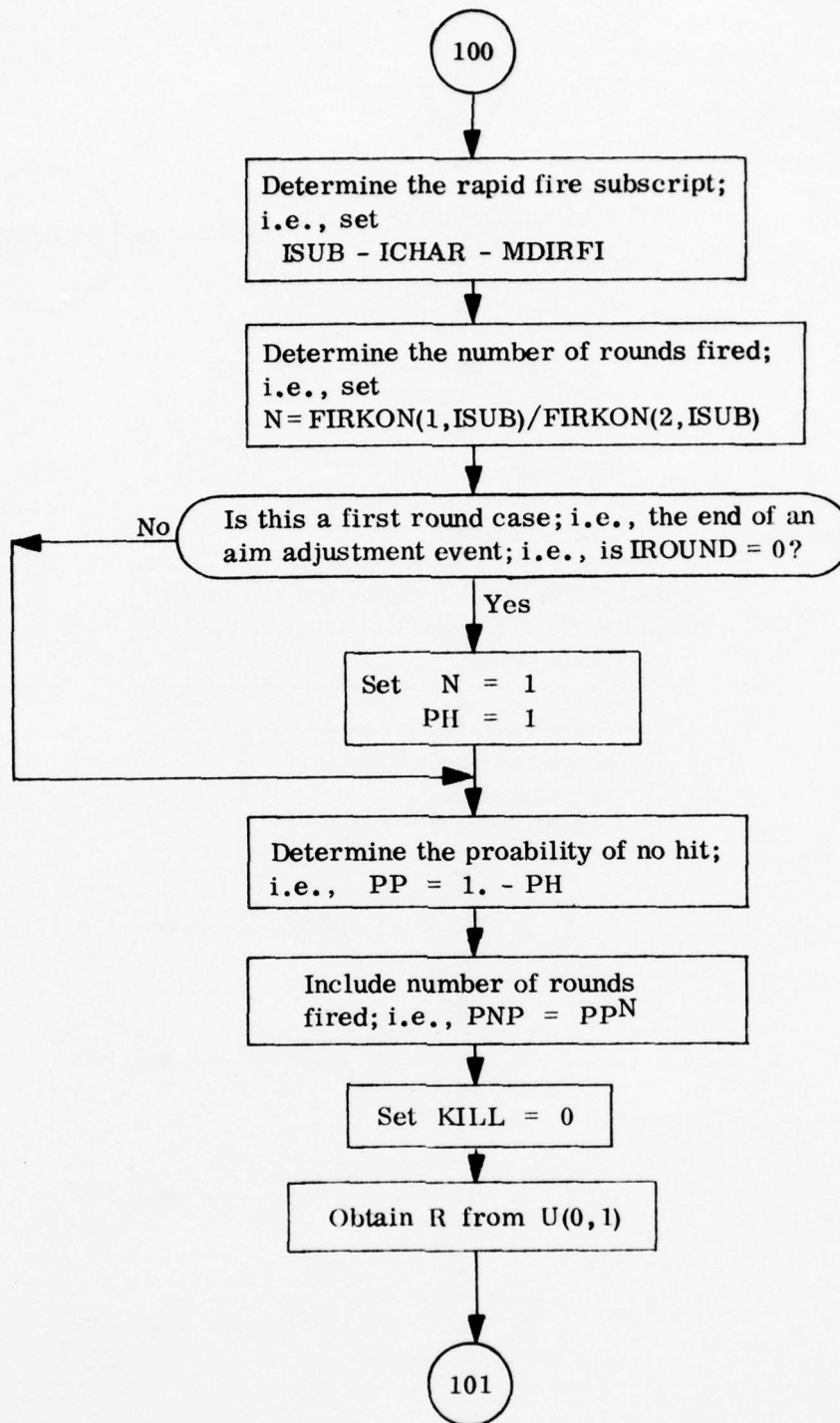
LENGTH: BCC₁₆ = 3020₁₀ bytes



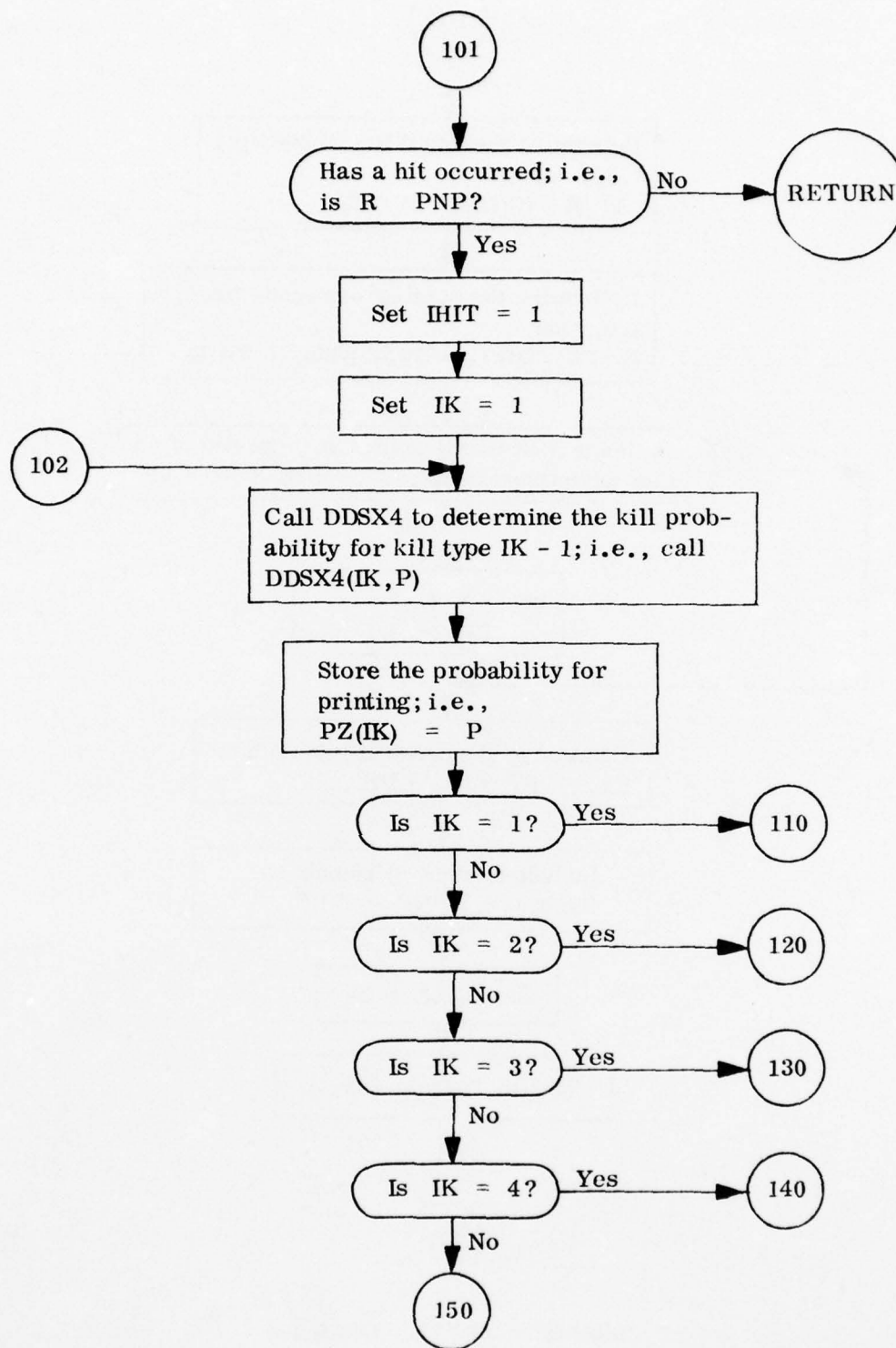
Subroutine TLETH: Firing Event Lethality



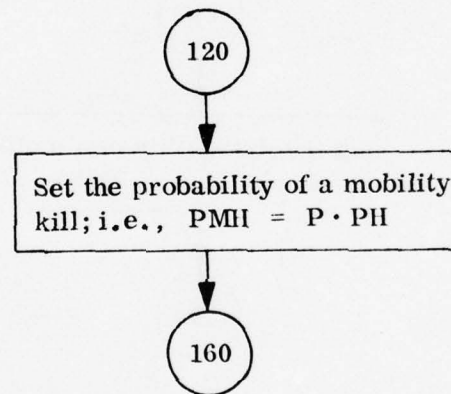
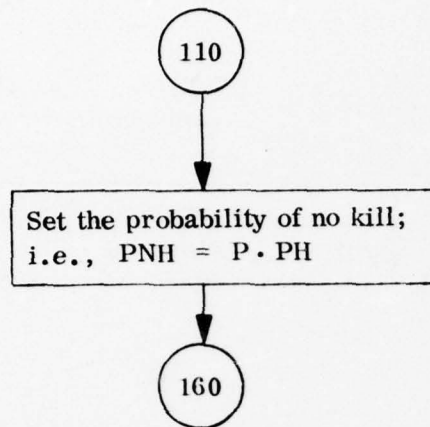
Subroutine TLETH: Continued



Subroutine TLETH: Continued



Subroutine TLETH: Continued



Subroutine TLETH: Continued

AD-A040 054

OHIO STATE UNIV COLUMBUS SYSTEMS RESEARCH GROUP
EXTENSION TO THE LAND COMBAT MODEL (DYNCOM). VOLUME 2, SECTION --ETC(U)
DEC 71 G M CLARK, R J WILHELM
DAAH01-70-C-0713

F/G 15/7

UNCLASSIFIED

RF-2995-FR 71-2(U)-SEC-2

NL

6 OF 6

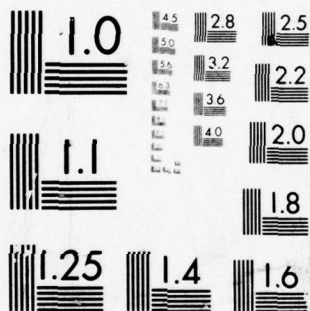
AD
A040 054



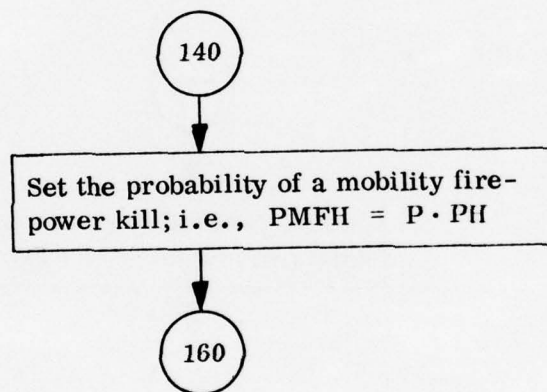
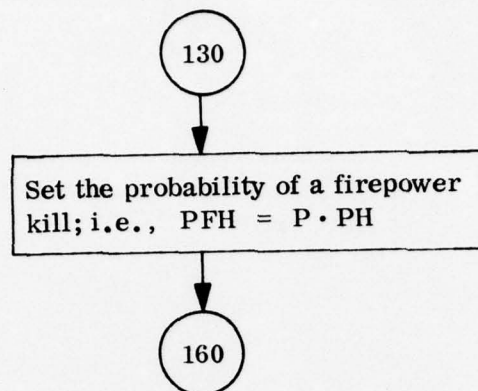
END

DATE
FILMED

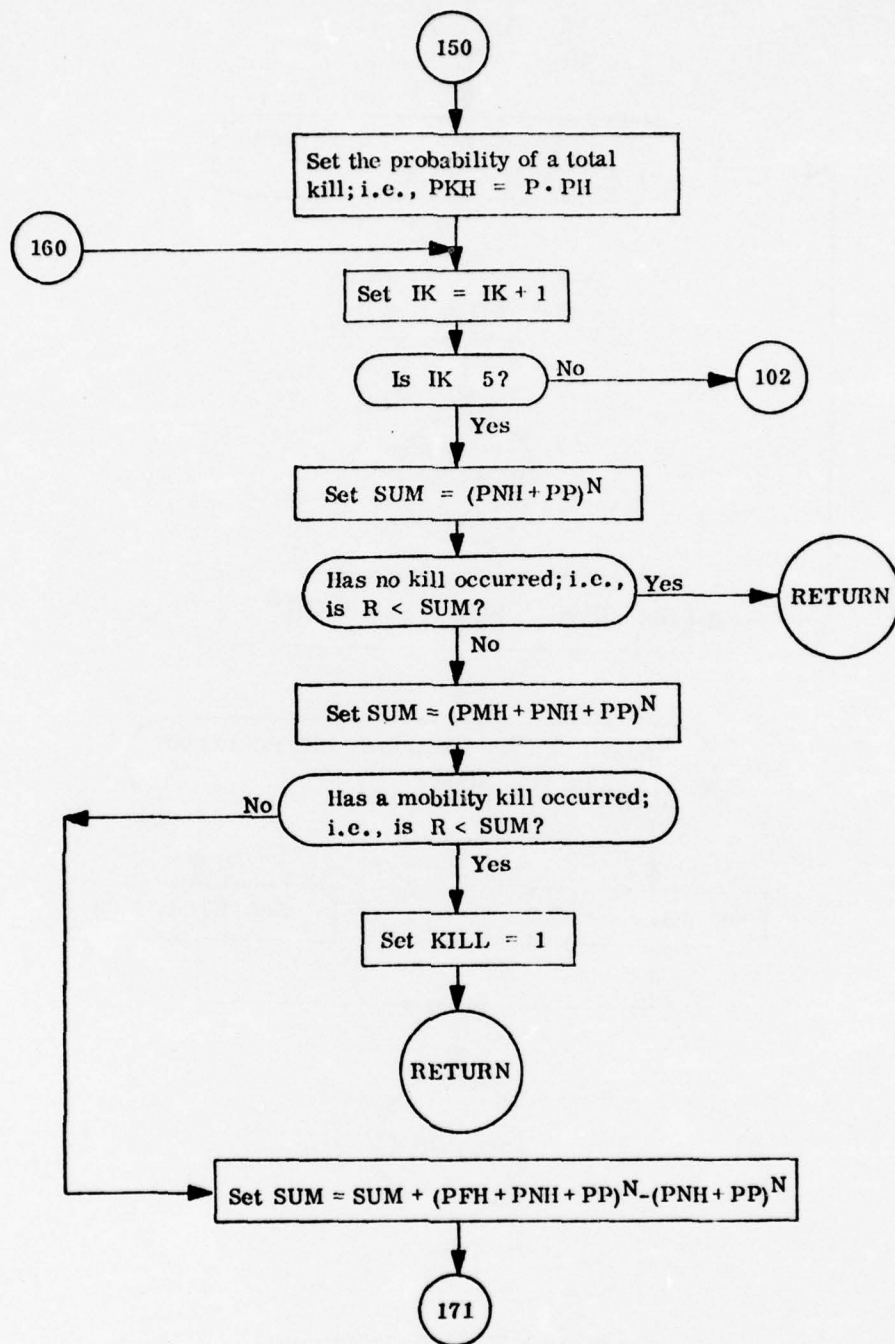
6-77



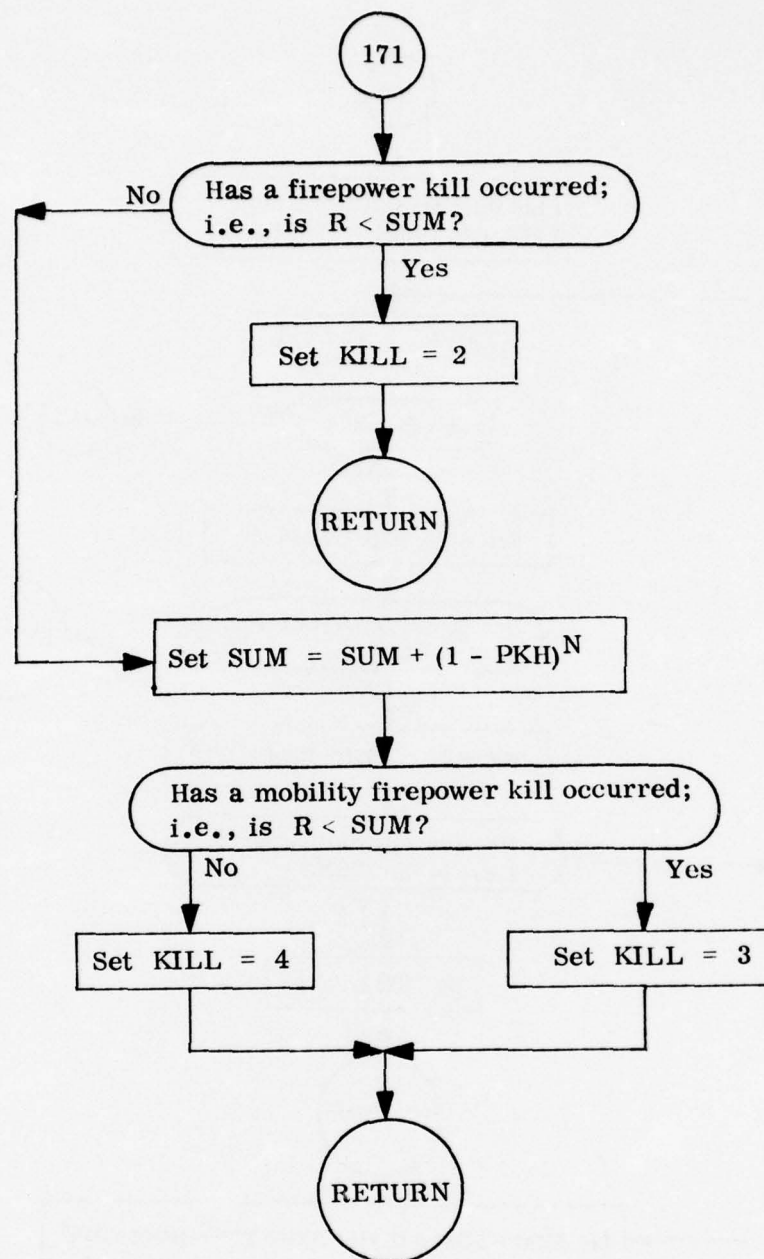
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



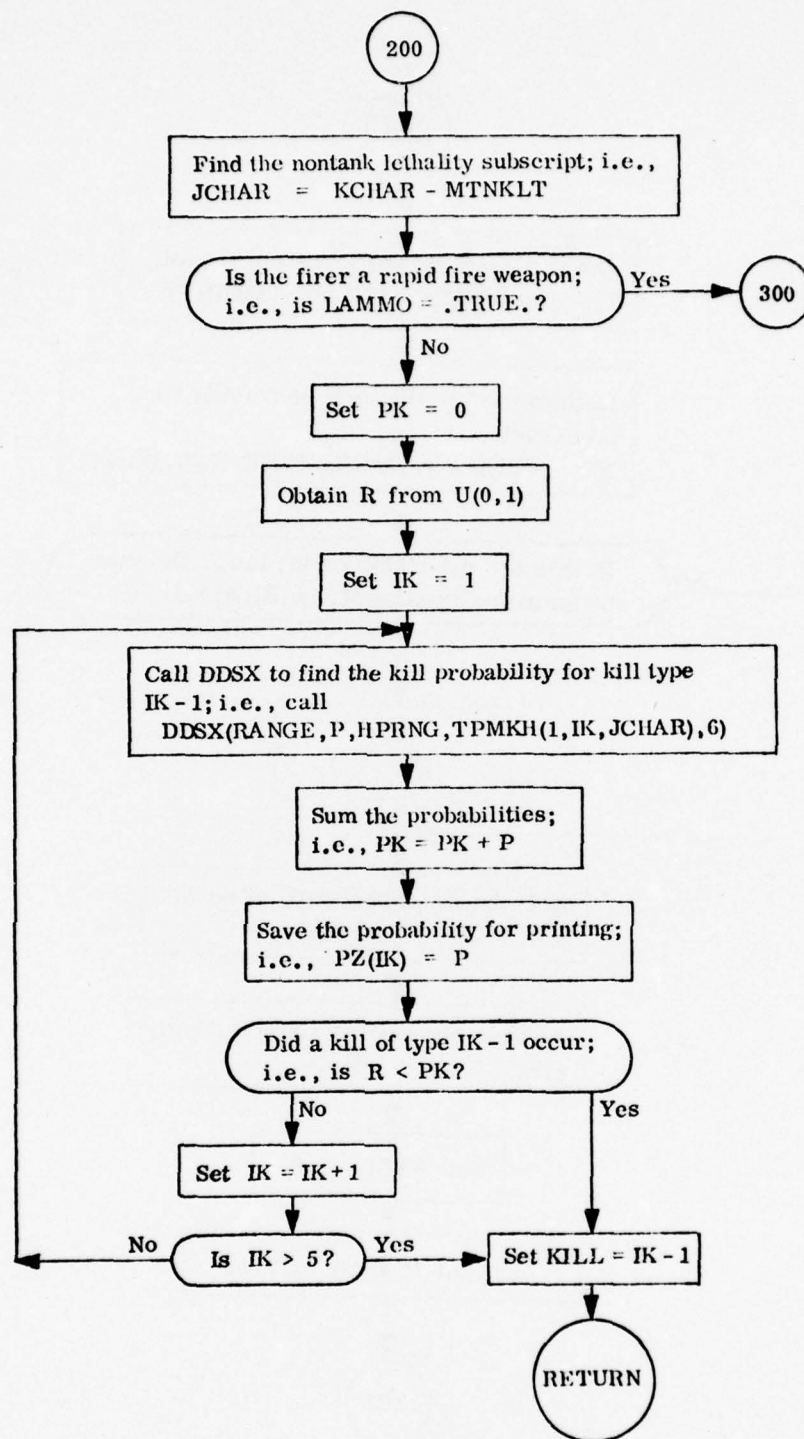
Subroutine TLETH: Continued



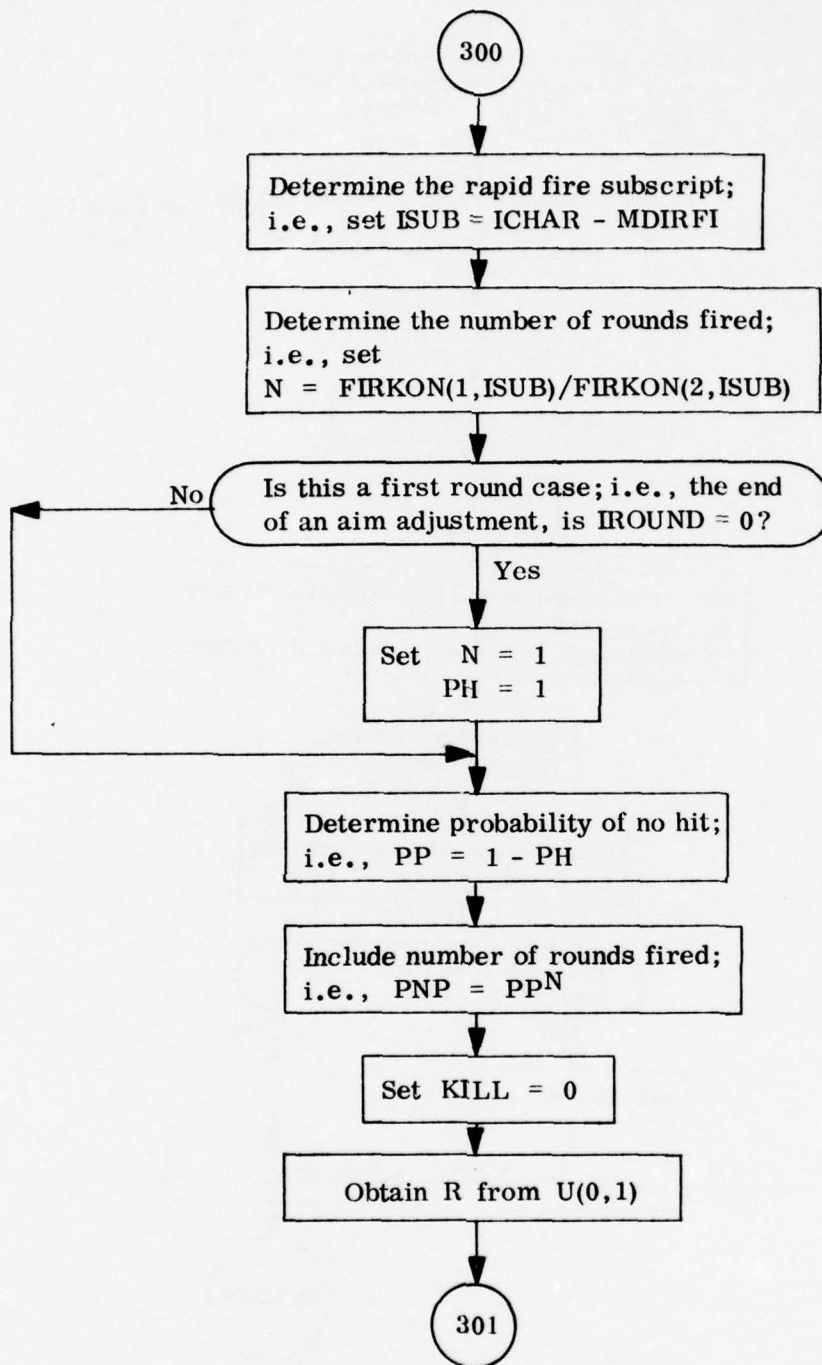
Subroutine TLETH: Continued



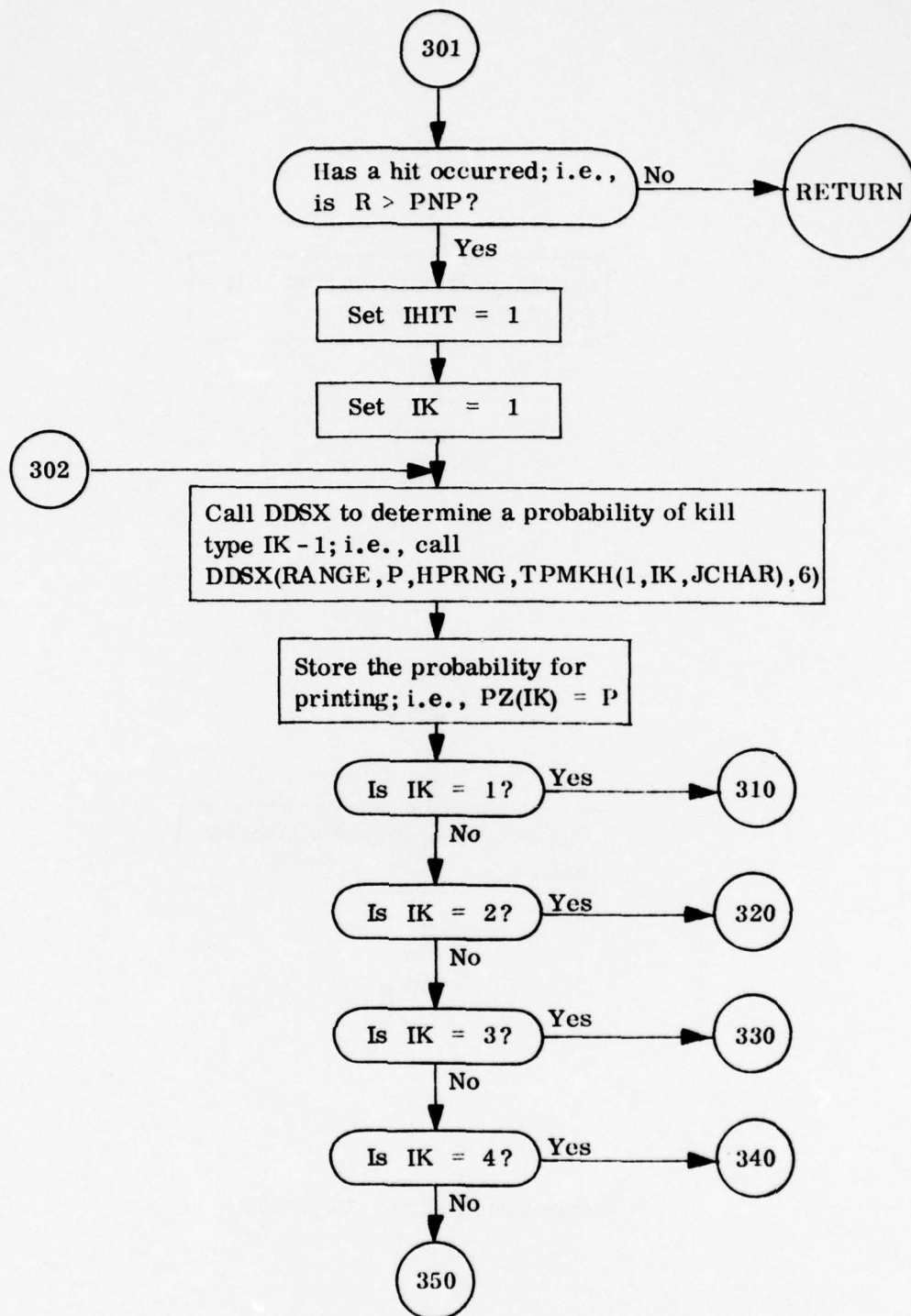
Subroutine TLETH: Continued



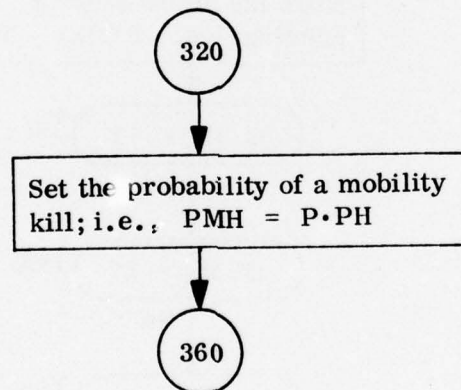
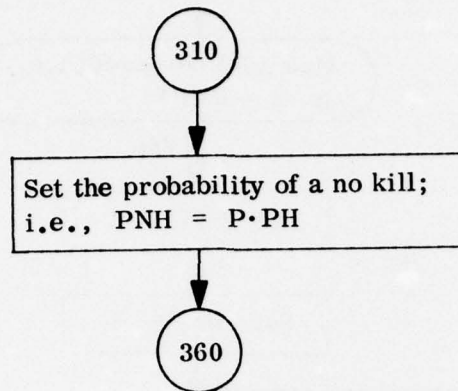
Subroutine TLETH: Continued



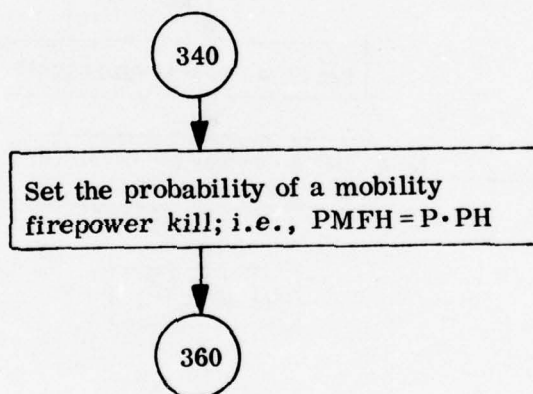
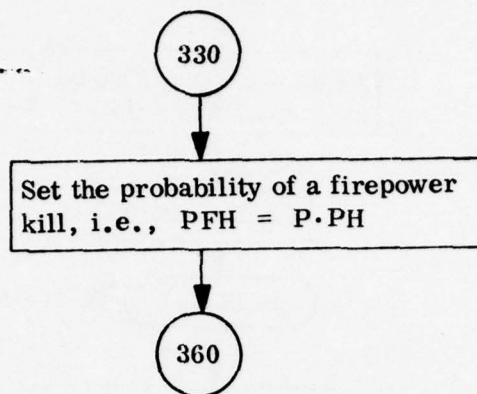
Subroutine TLETH: Continued



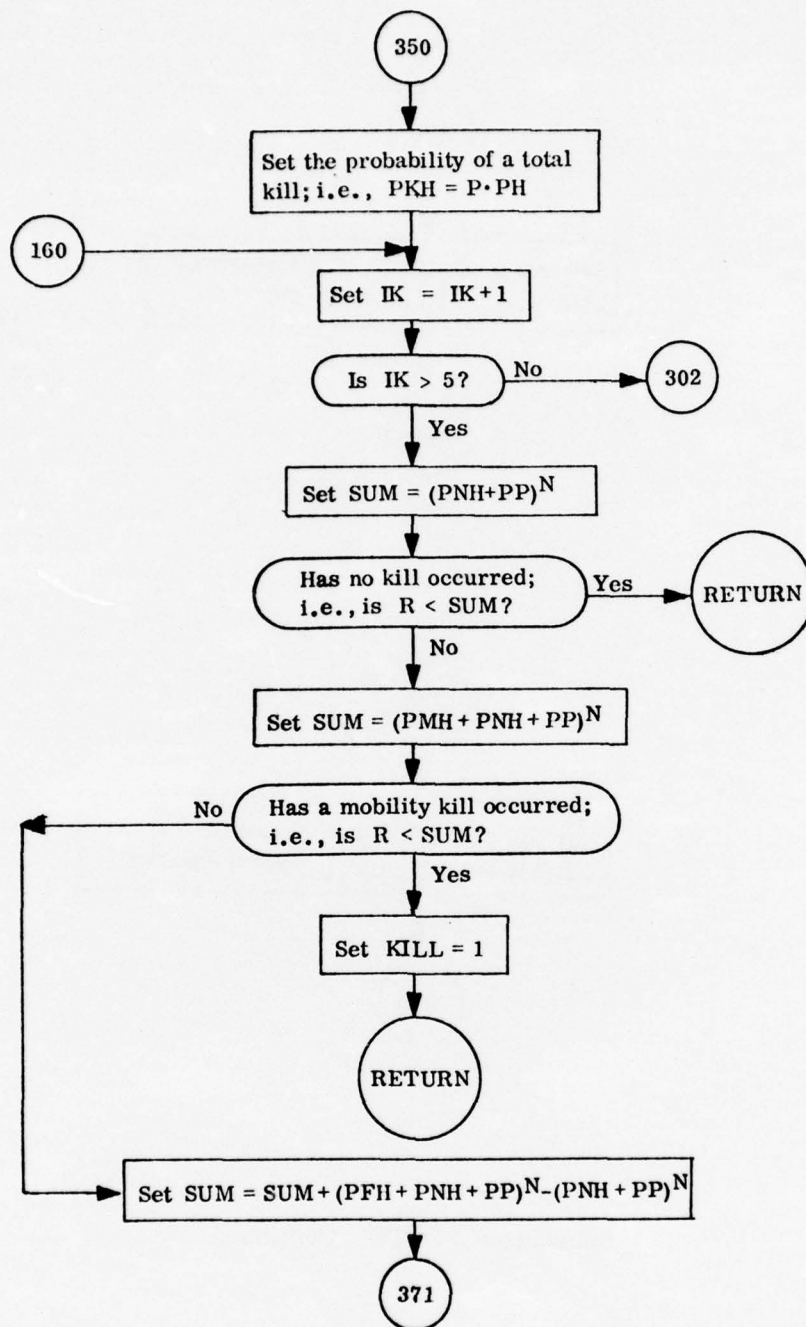
Subroutine TLETH: Continued



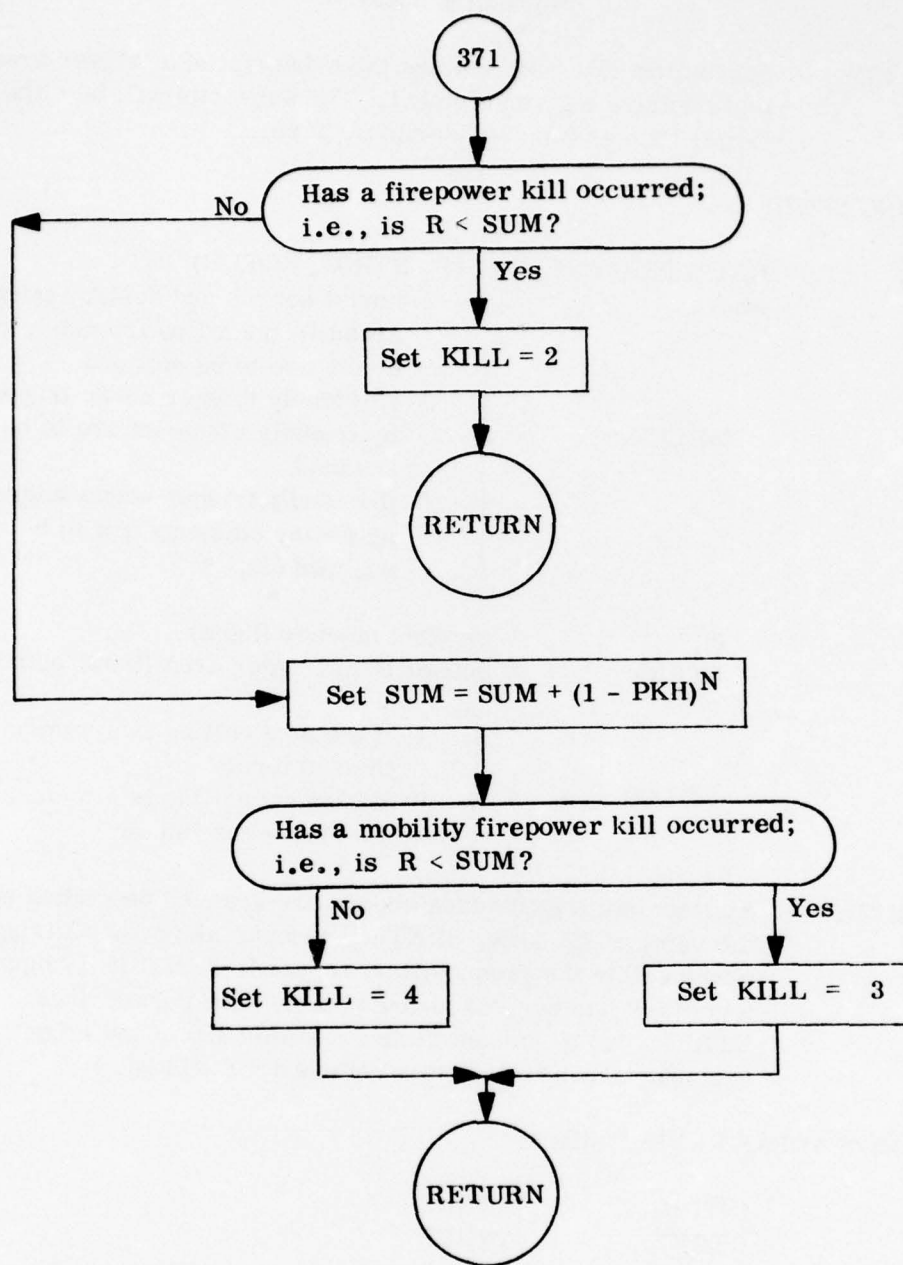
Subroutine TLETH: Continued



Subroutine TLETH: Continued



Subroutine TLETH: Continued



Subroutine TLETH: Continued

Subroutine TRIG

PURPOSE: Subroutine TRIG determines the subscript of a trigger area that contains a given element. The subscript will be either larger than an input subscript or zero.

CALLING SEQUENCE:

CALL TRIG (ISELEK, IT, NTRIG, KOLOR)

where

ISELEK = { 2 aerial search and destroy trigger areas triggered by friendly elements are to be scanned
1 if friendly trigger areas triggered by friendly elements are to be scanned
0 if friendly trigger areas triggered by enemy elements are to be scanned (input)

IT = element number (input)

NTRIG = subscript of trigger area (input/output)

KOLOR = { 1 if element calling is a member of the red force
0 if element calling is a member of the blue force (input).

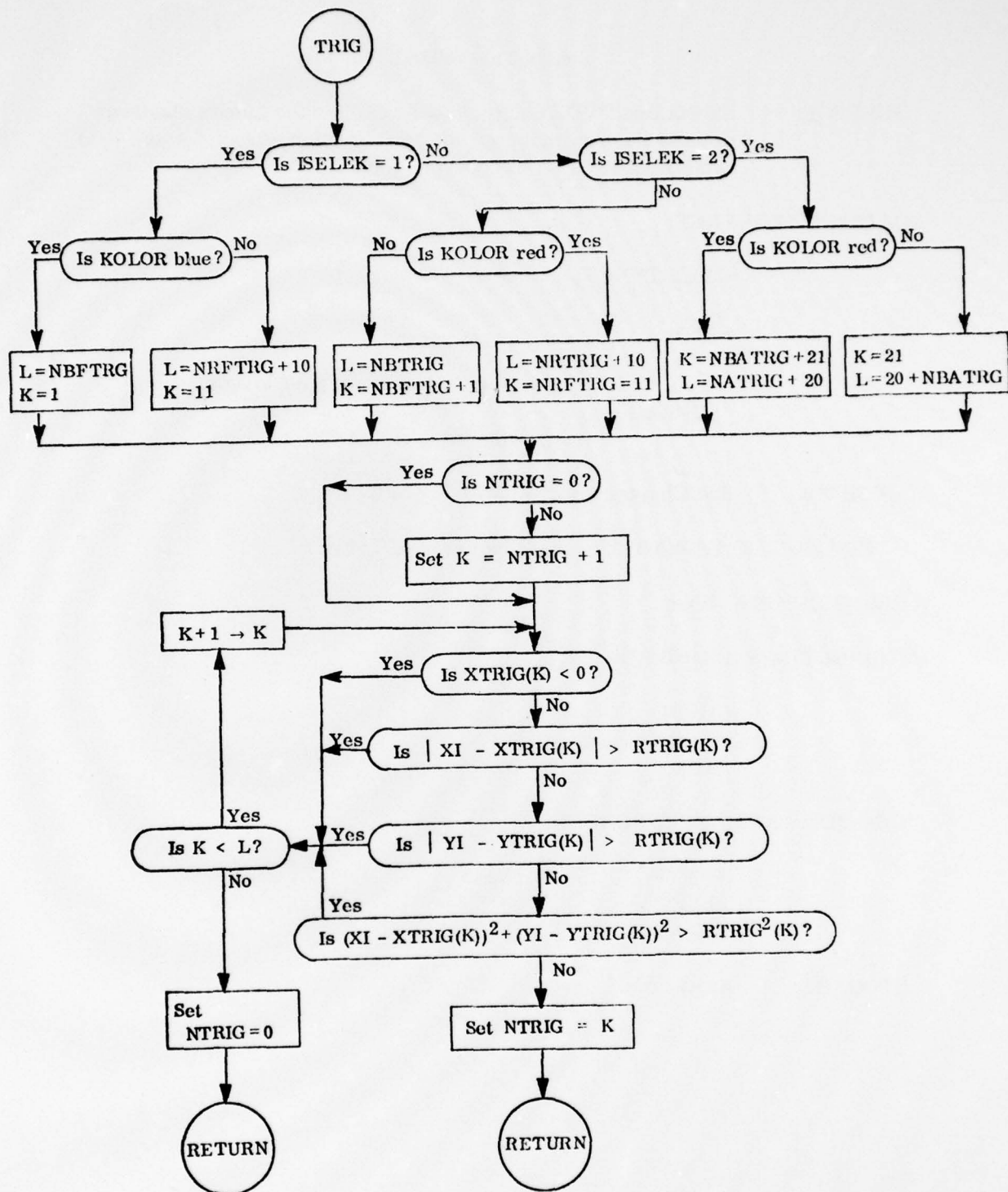
METHOD: Appropriate trigger area groups are scanned depending upon the value of ISELEK. If NTRIG is input as zero, all trigger areas within the group will be scanned. If NTRIG is input as a positive number, the search starts with trigger area NTRIG + 1. If element IT is not within any of the trigger areas scanned, a value of zero is returned for NTRIG.

COMMON AREAS REFERENCED:

INTRIG XTRIG
RTRIG YTRIG

SUBROUTINES REQUIRED:

ELOC



Subroutine TRIG: Trigger Area Analysis

Subroutine TVDET

PURPOSE: Subroutine TVDET determines whether the human observer detects the target image on the television screen for the E-O missile system on the current fixation.

CALLING SEQUENCE:

CALL TVDET(IFLAG)

where

$$\text{IFLAG} = \begin{cases} 2 & \text{missile has flown past target} \\ 1 & \text{otherwise} \end{cases}$$

METHOD: See Chapter 2 of RF 2376 FR-5(S).

DEFINITION OF VARIABLES: See Chapter 2 of Volume 5.

RESTRICTIONS: None

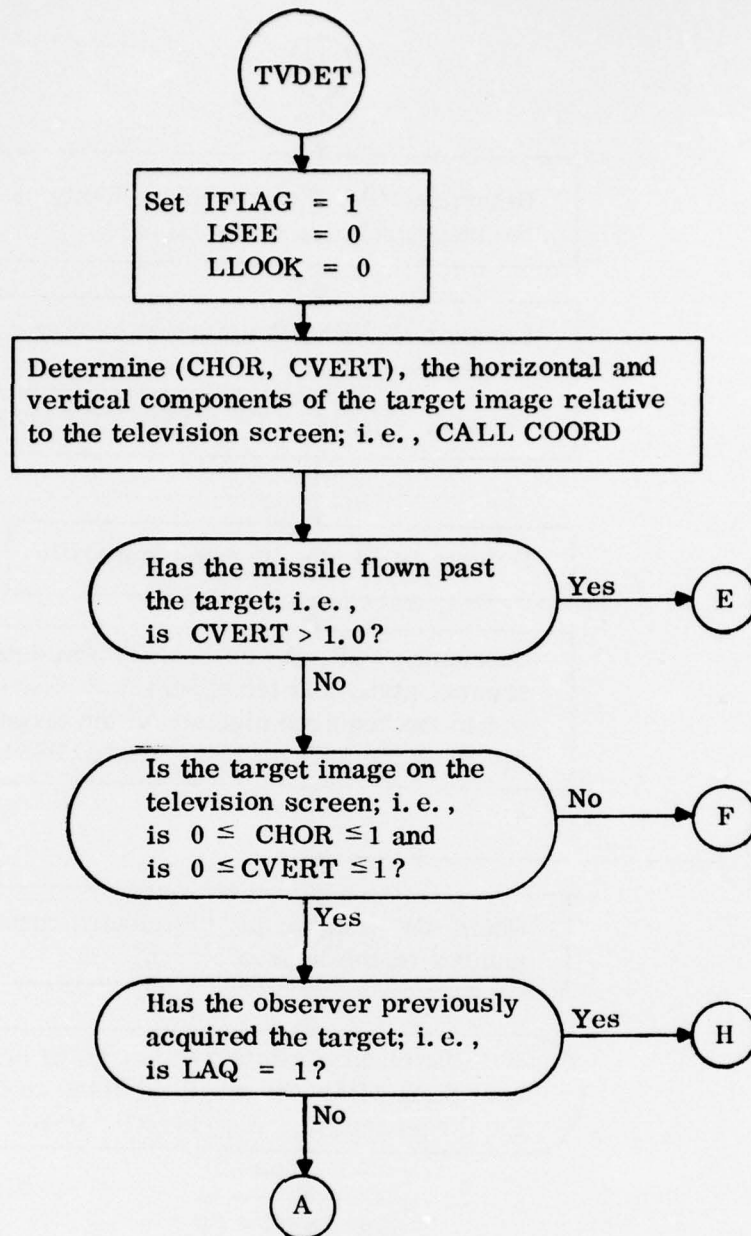
SUBROUTINES REQUIRED:

COORD
PLOOKY
PSEE

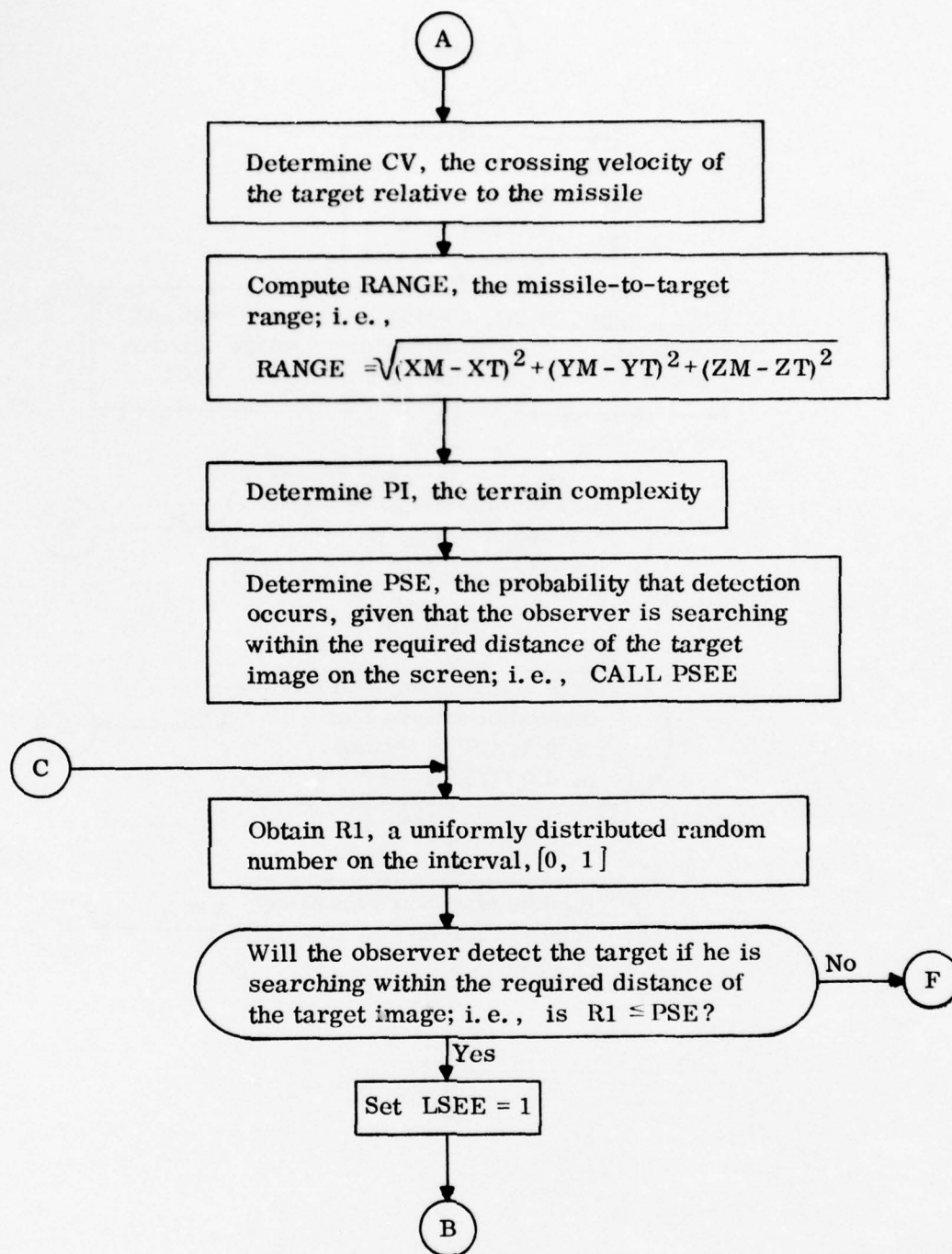
COMMON AREAS REFERENCED:

| | | |
|--------|------|-------|
| DETV | MIFO | TVMIS |
| LNSET | OPEN | TVOPT |
| MIDATA | | |

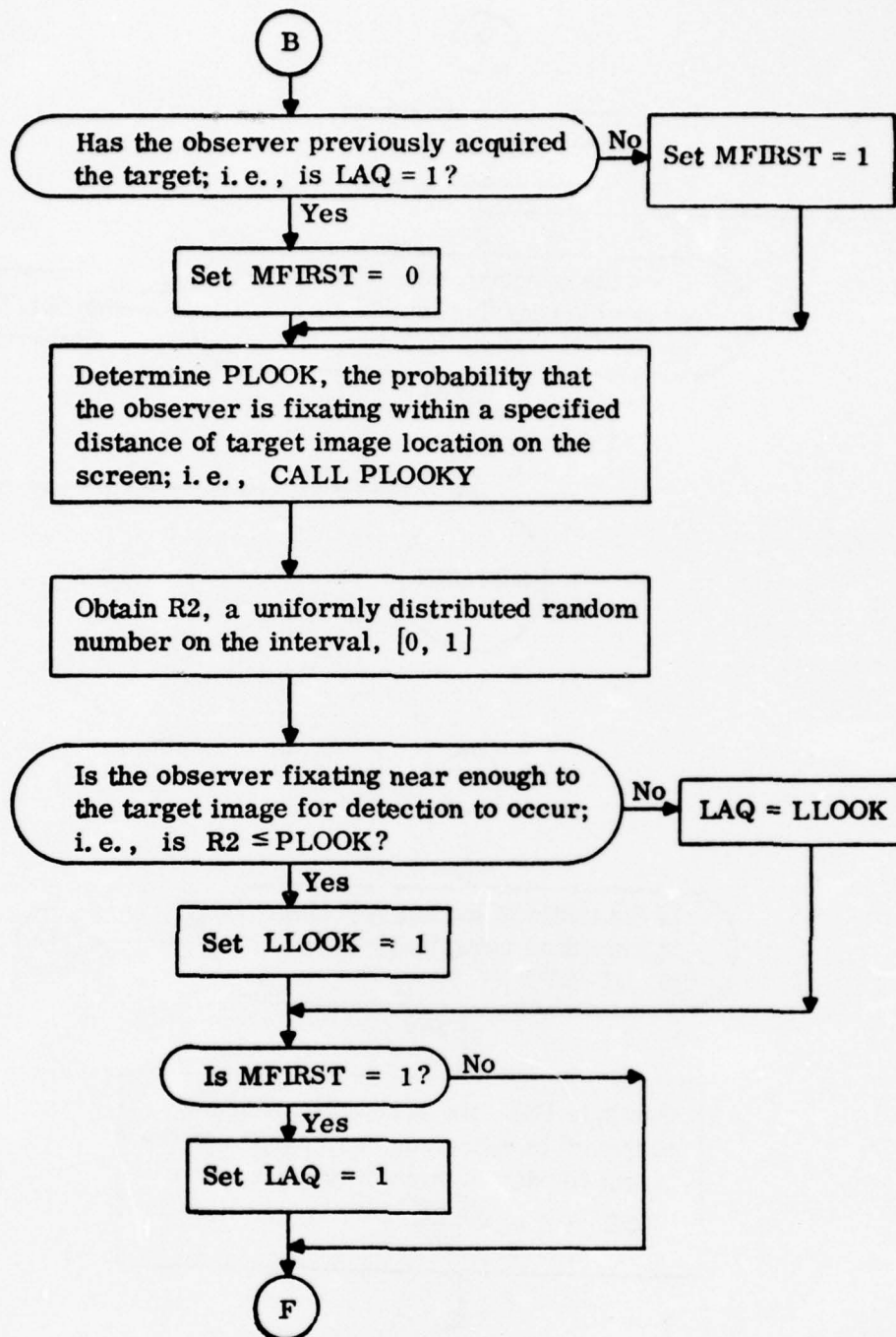
STORAGE: 544 words



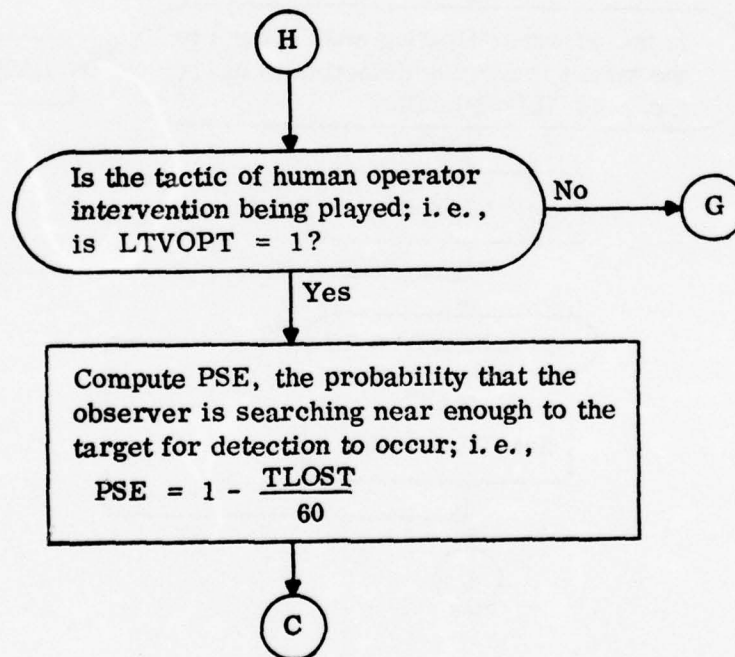
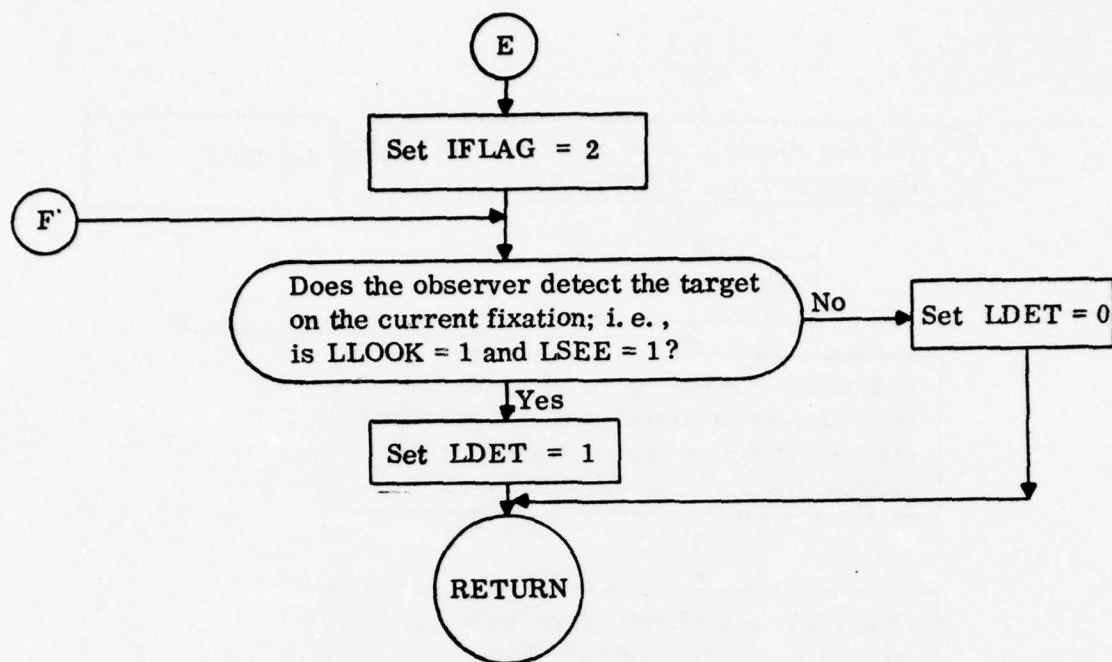
Subroutine TVDET: Determination of Detection Status
E-O Missile System



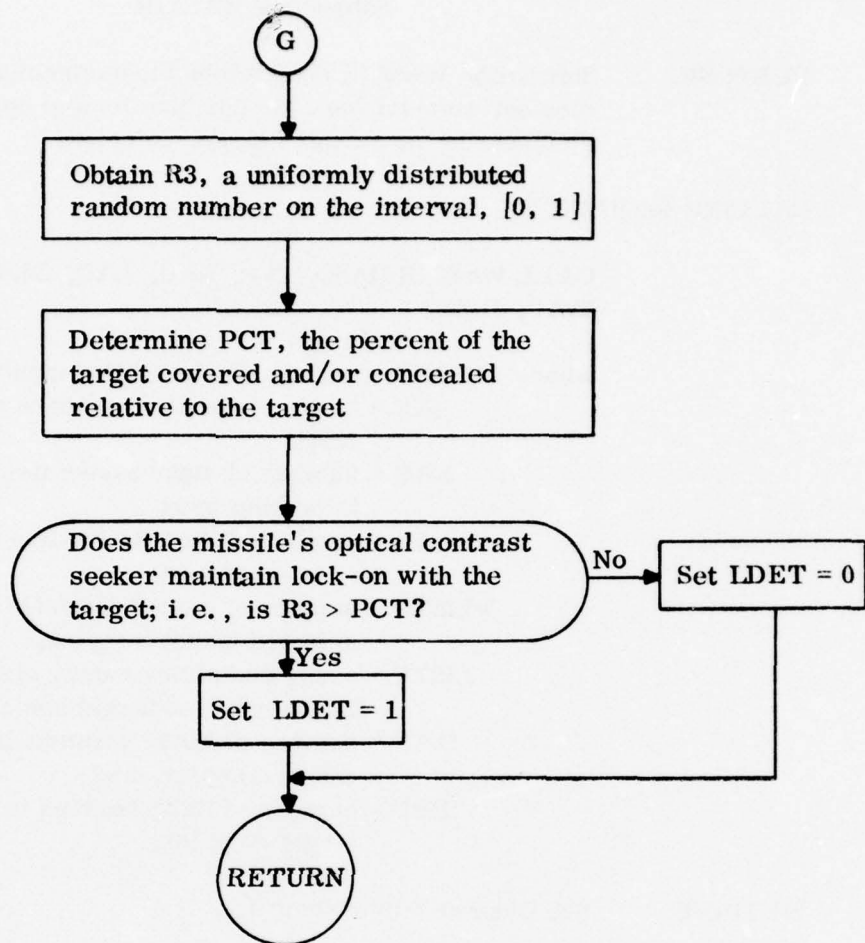
Subroutine TVDET: Continued



Subroutine TVDET: Continued



Subroutine TVDET: Continued



Subroutine TVDET: Continued

Subroutine WASAIR

PURPOSE: Subroutine WASAIR determines the assignment of aerial vehicle element-ammunition code combinations to specified enemy elements in the selected target complex.

CALLING SEQUENCE:

CALL WASAIR (IASC, IAE, KAU, LAU, NLISTU, LISTU, IAAU, IBBU)

where IASC = aerial vehicle section number,
IAE = array of element numbers of section IASC,
KAU = number of suppressive fire weapons to be employed,
LAU = number of destructive fire weapons to be employed,
NLISTU = number of enemy elements in the selected target complex,
LISTU = array containing enemy element numbers in the selected target complex,
IAAU = number of heavy weapons in the selected target complex, and
IBBU = number of light weapons in the selected target complex.

METHOD: See Chapter 6 of Volume 1.

COMMON AREAS REFERENCED:

| | | |
|---------|--------|--------|
| AMOSPY | KAMPRD | NUMBER |
| BRAIR | KELAGN | |
| FACTL | ITYPA | |
| KAMAVL | LHICE | |
| KAMMAX | LWCOD | |
| KAMOA V | NAMO | |

SUBROUTINES USED:

ERROR

WASAIR CALLED BY: AIRFIR

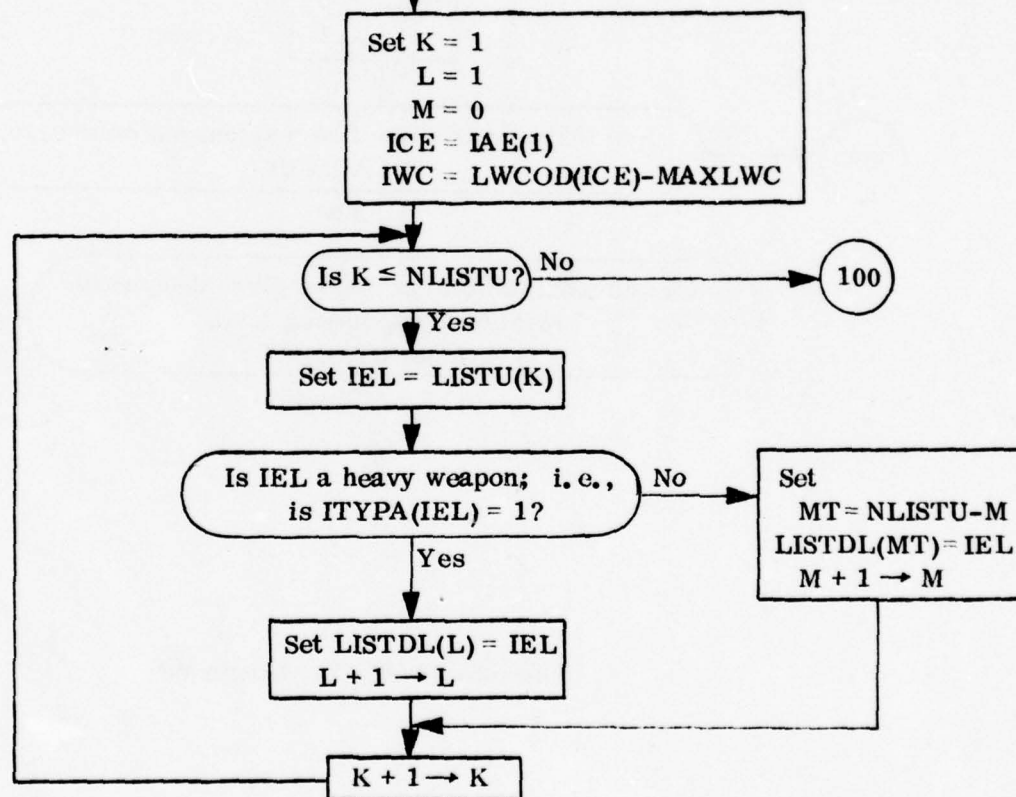
LENGTH: 1914₁₆ 6420₁₀ bytes

B-746

WASAIR

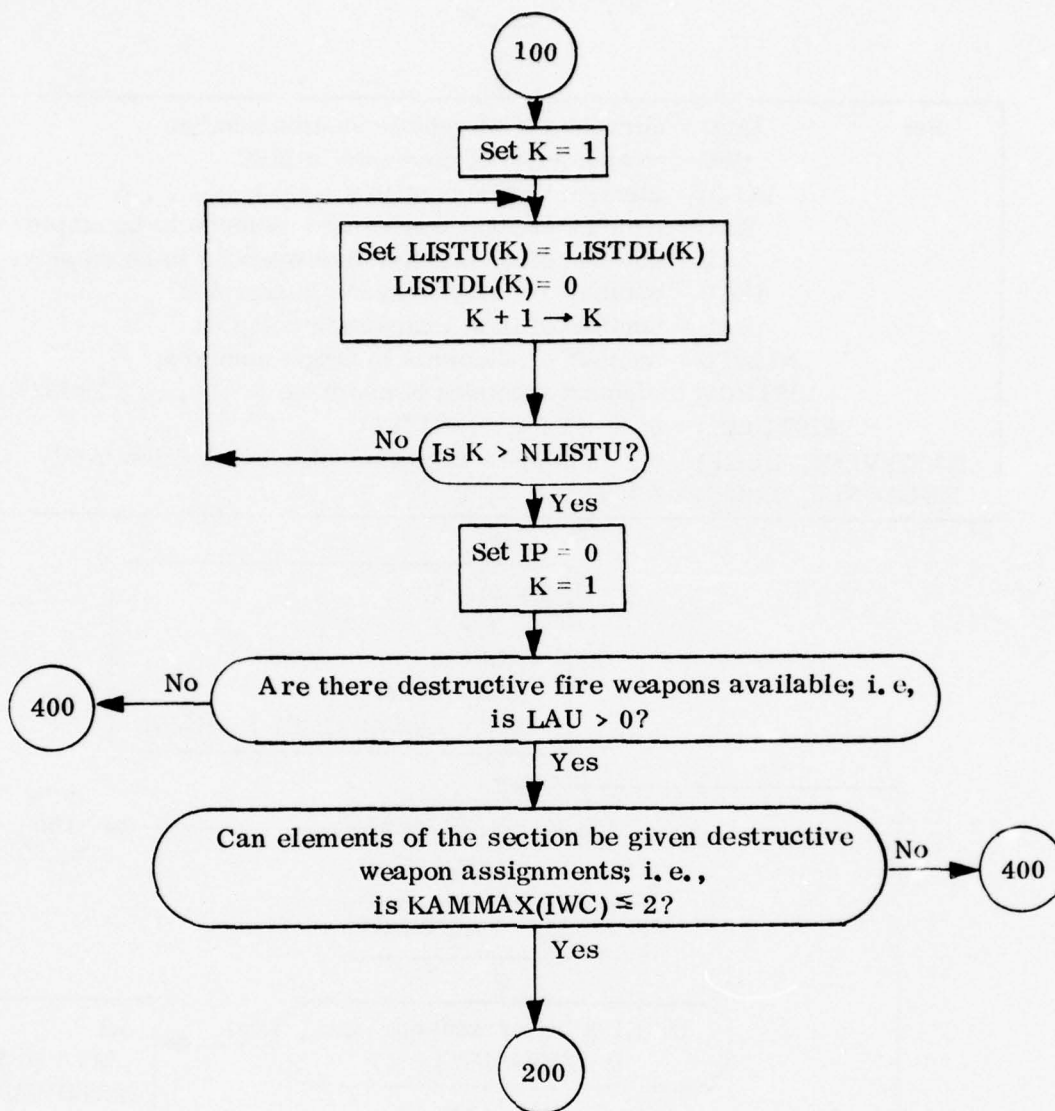
Set

IASC = current aerial vehicle section number
 IWC = weapon code of elements in IASC
 IAE(I) = element numbers in IASC; $I = 1, \dots, 4$
 KAU = number of suppressive fire weapons to be employed
 LAU = number of destructive fire weapons to be employed
 IAAU = number of heavy weapons in complex
 IBBU = number of light weapons in complex
 NLISTU = number of elements in target complex
 LISTU(K) = element numbers in complex; $K = 1, \dots, NLISTU$
 LISTDL(K) = 0; $K = 1, \dots, NLISTU$
 KAMAVL(M, LHCE) = 0 } helicopter elements LHCE in section IASC
 KELAGN(M, LHCE) = 0 } $M = 1, 2, 3$

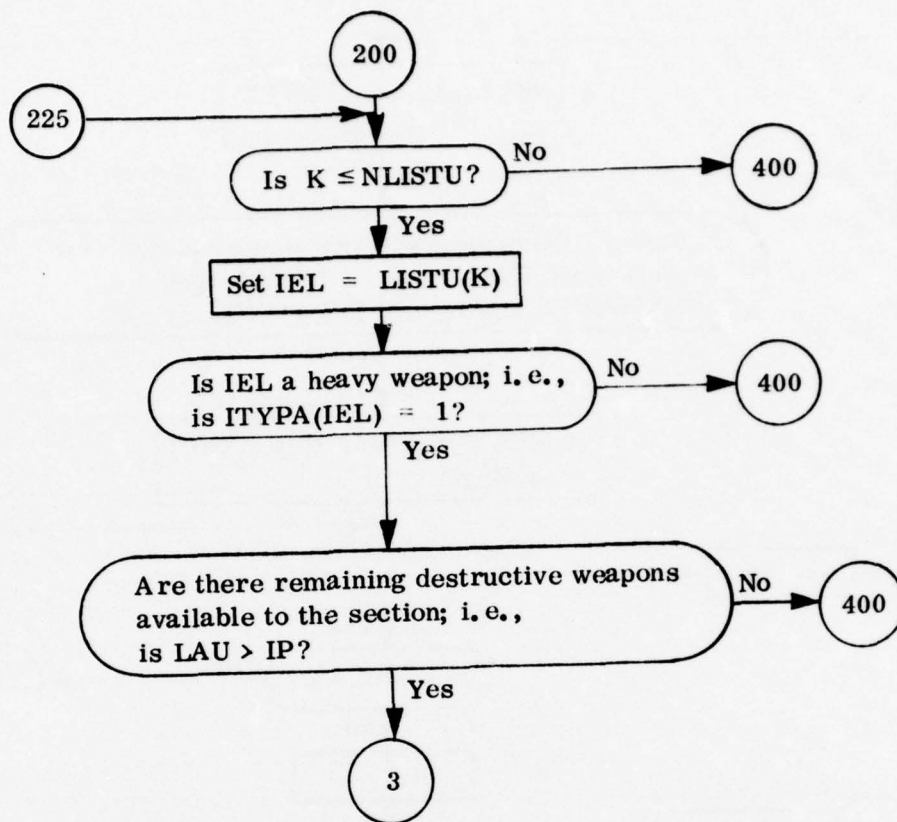


Subroutine WASAIR

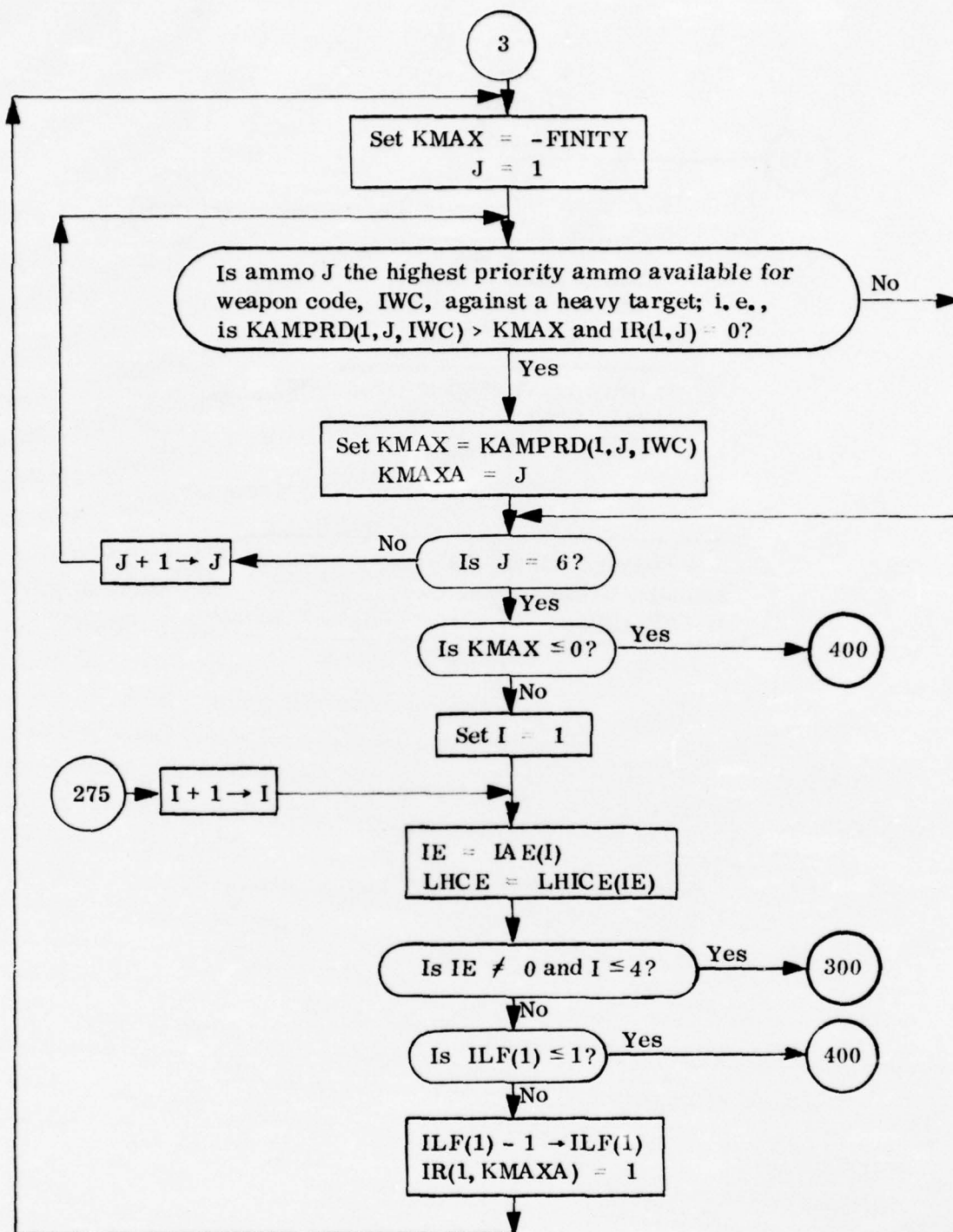
B-747



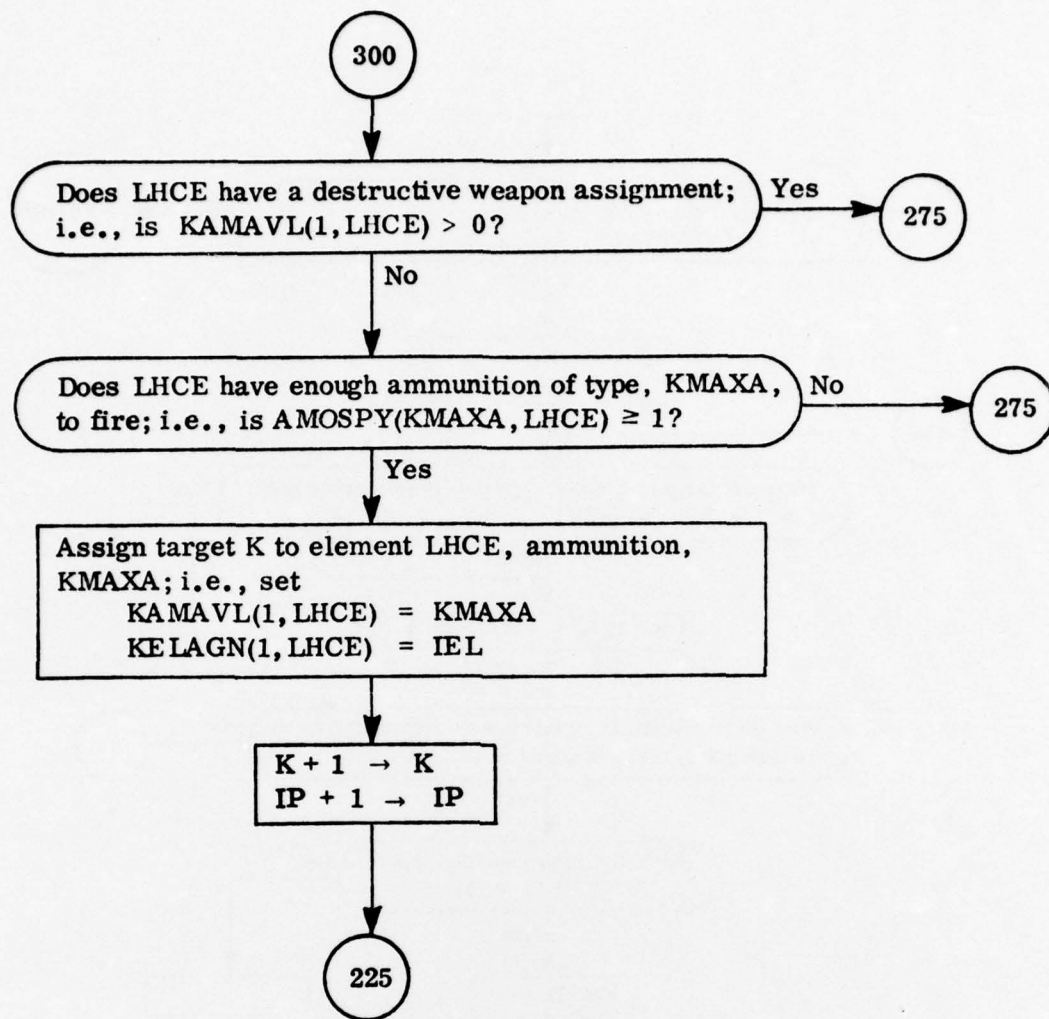
Subroutine WASAIR: Continued



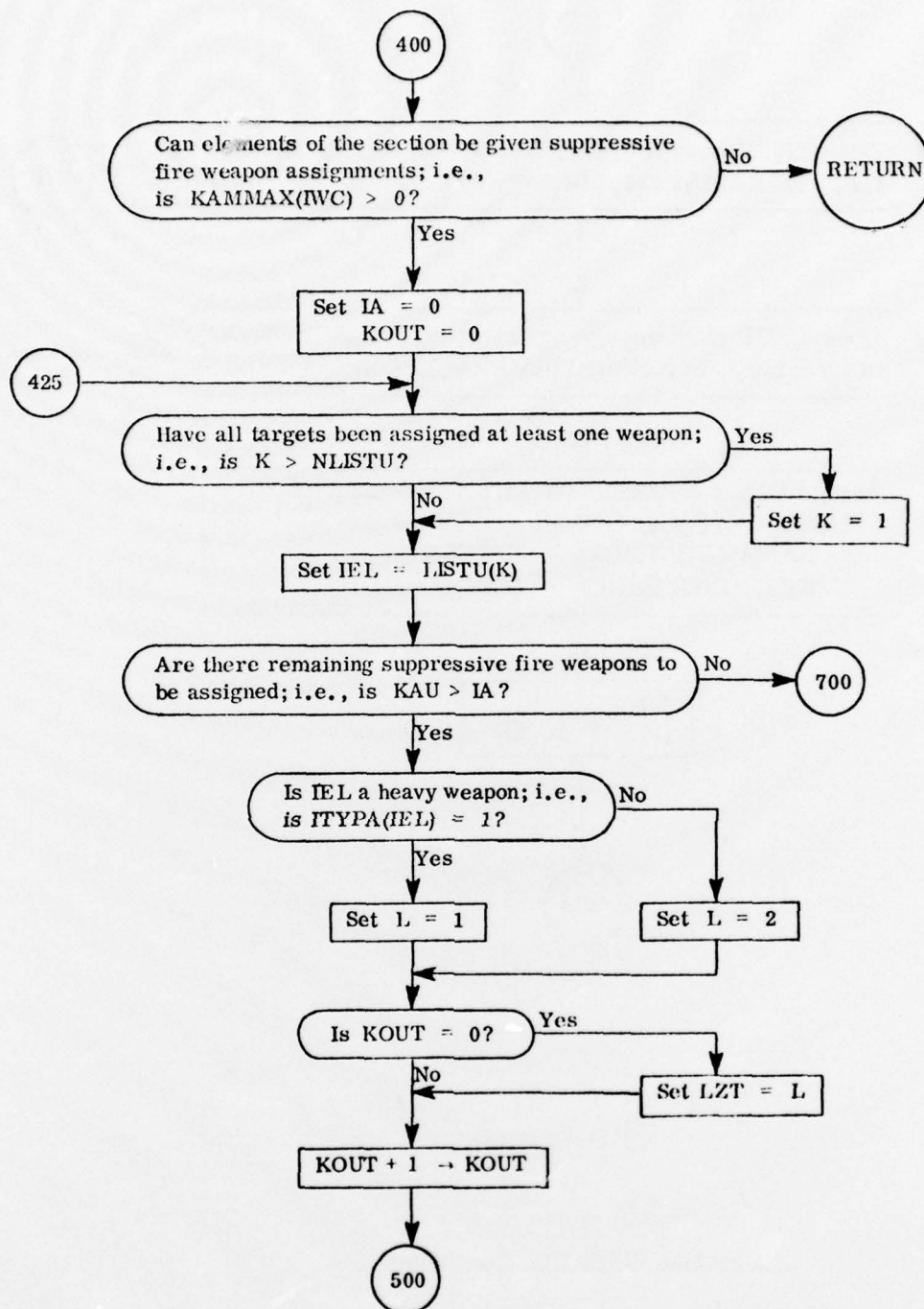
Subroutine WASAIR: Continued



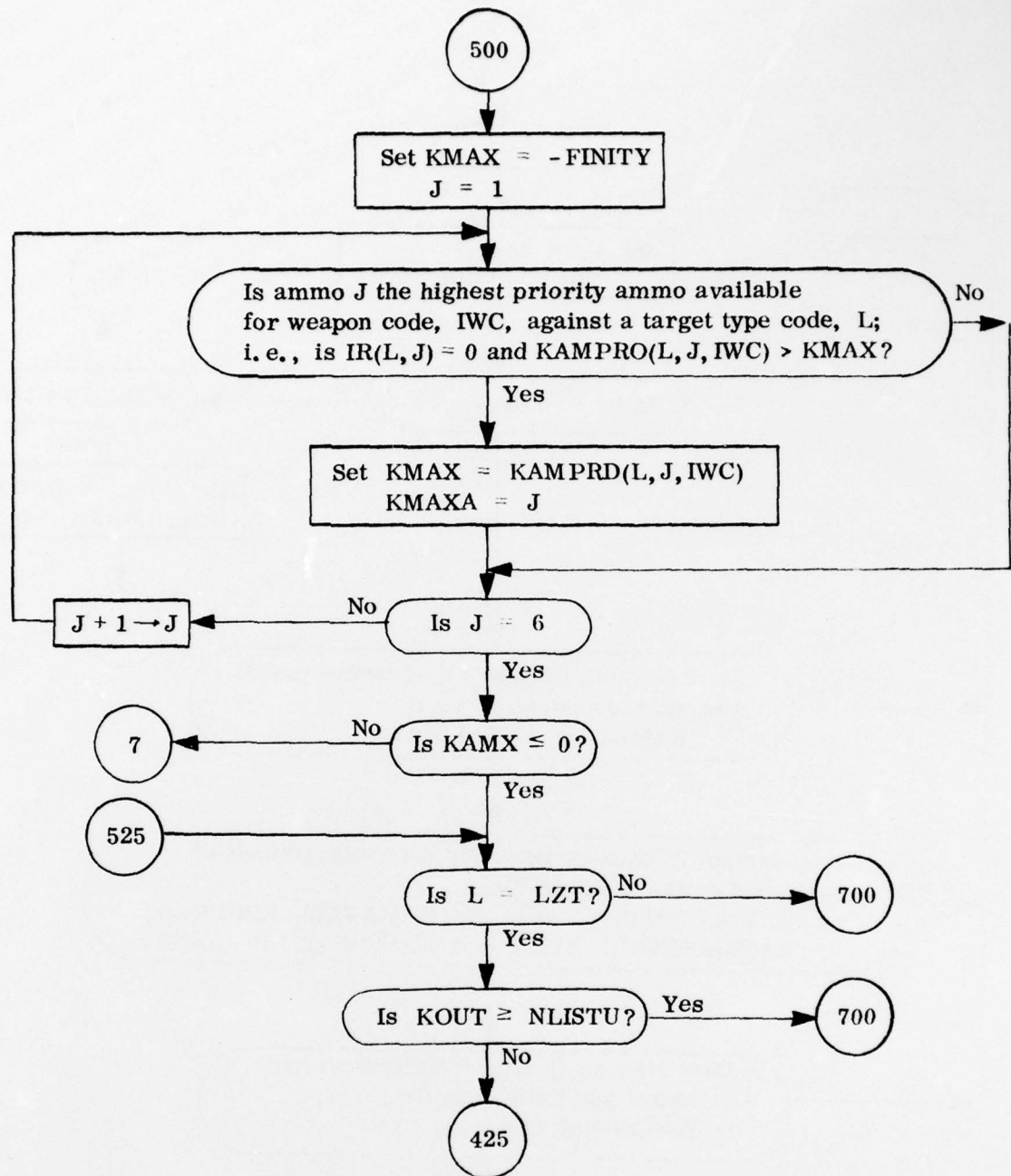
Subroutine WASAIR; Continued



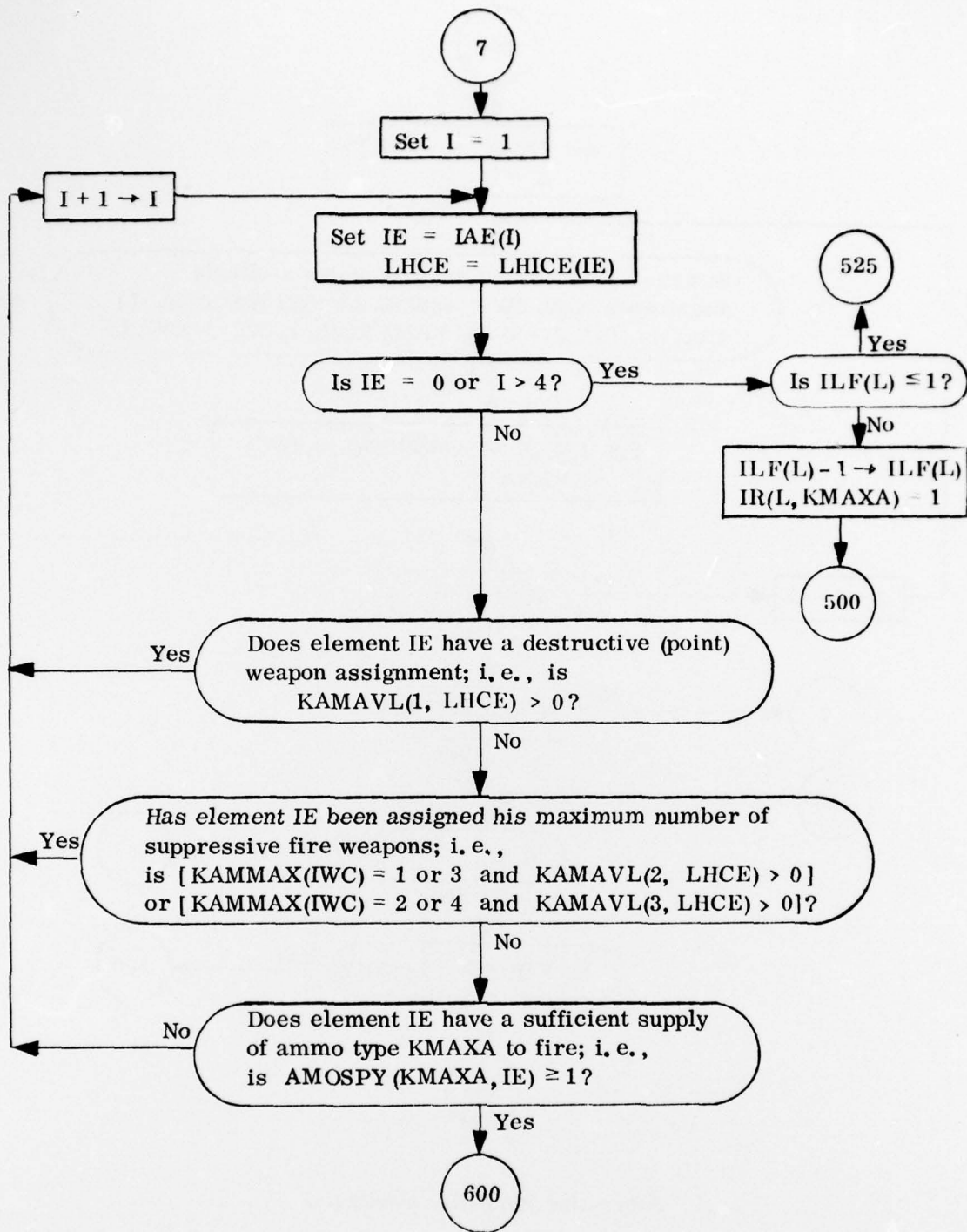
Subroutine WASAIR: Continued



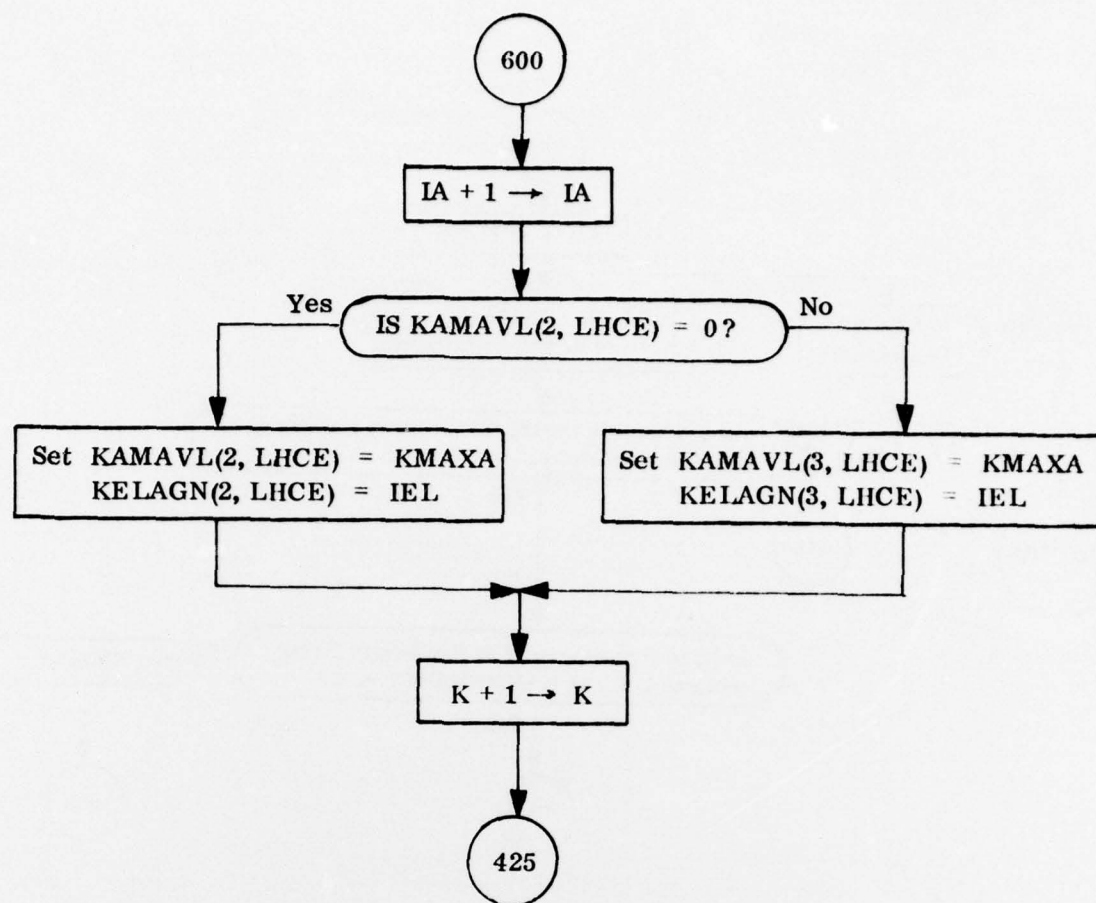
Subroutine WASAIR: Continued



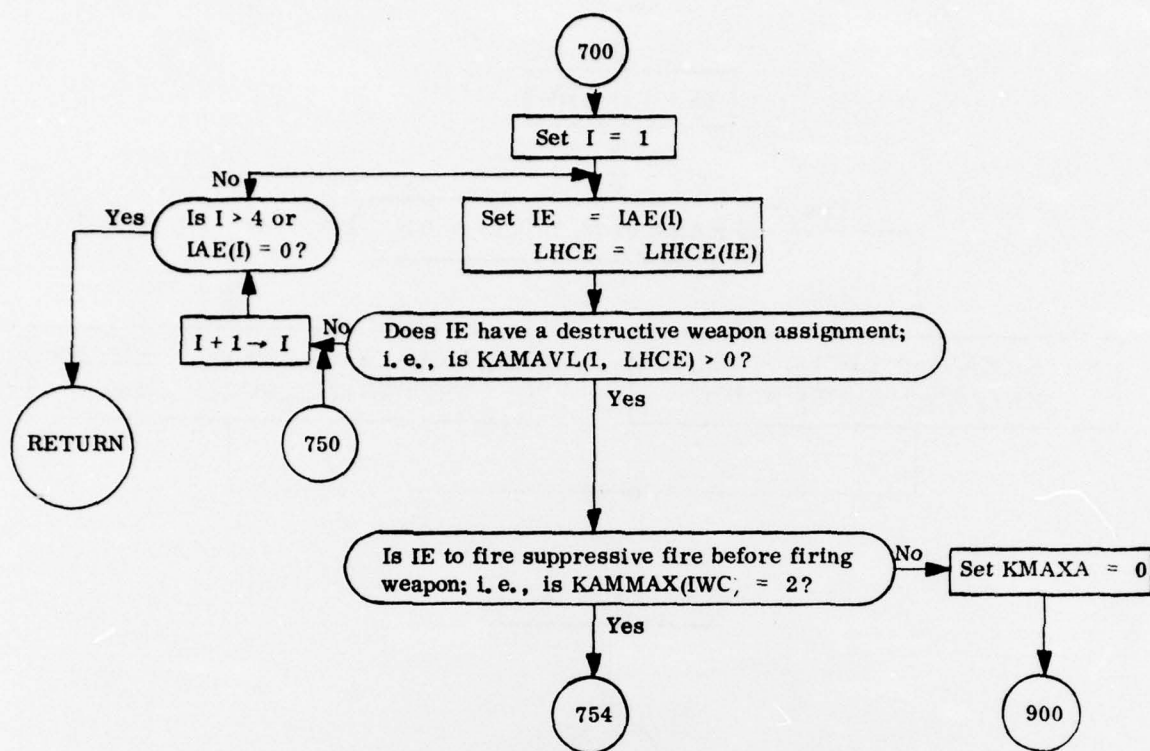
Subroutine WASAIR: Continued



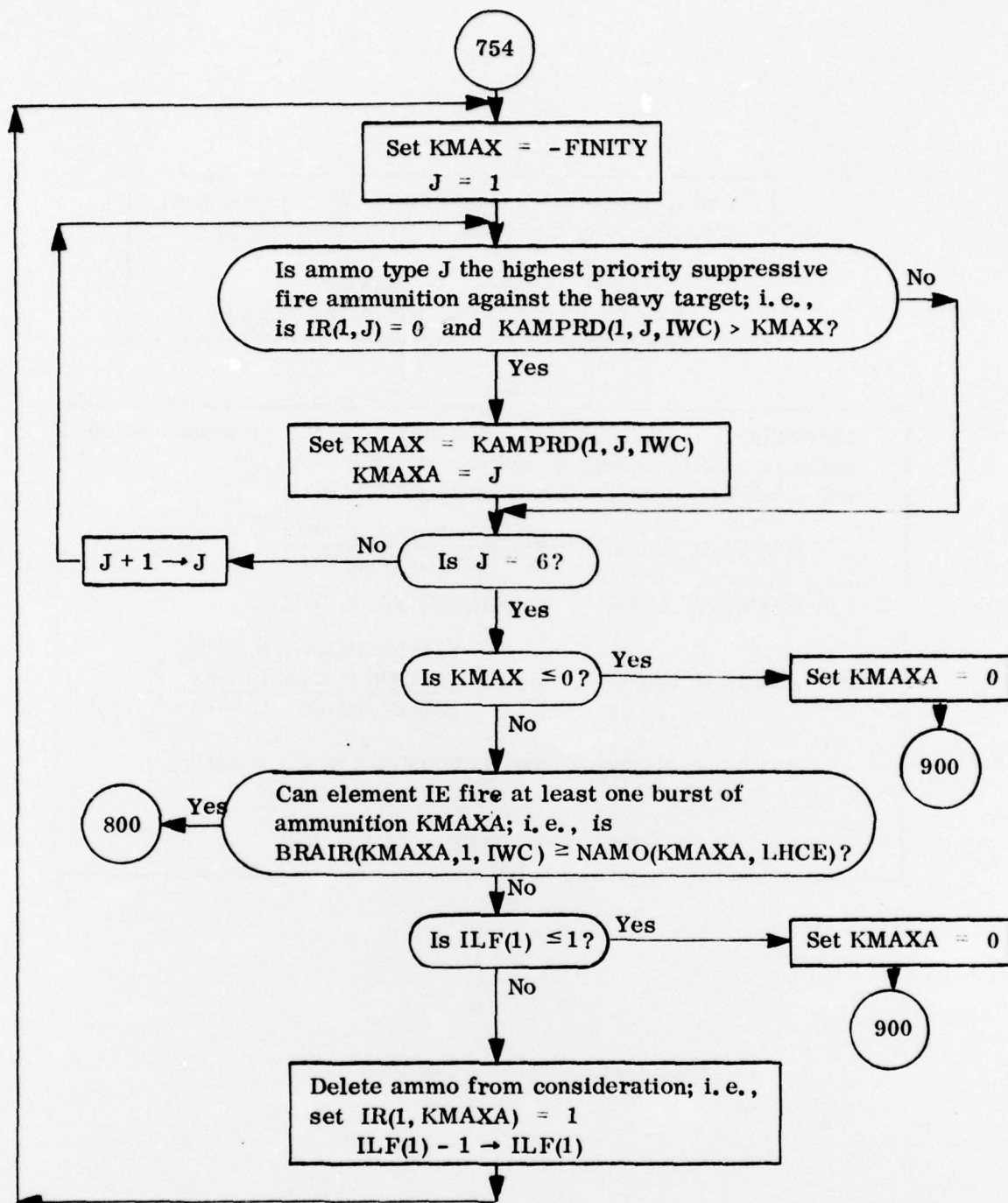
Subroutine WASAIR: Continued



Subroutine WASAIR: Continued



Subroutine WASAIR: Continued



Subroutine WASAIR: Continued

800

Assign target to element LHCE, ammunition type, KMAXA, to be fired before firing destructive weapon; i. e.,
 set KMAVL(3, LHCE) = KMAXA
 KELAGN(3, LHCE) = KELAGN(1, LHCE)

Determine FACTL(LHCE, NZ), fire data type NZ for aerial vehicle element, LHCE, firing ammunition type, KMAXA; i. e.,
 set FACTL(1, LHCE) = BRAIR(KMAXA, 1, IWC)

$$\text{FACTL}(3, \text{LHCE}) = \frac{\text{BRAIR}(\text{KMAXA}, 1, \text{IWC})}{\text{BRAIR}(\text{KMAXA}, 3, \text{IWC})}$$

$$\text{FACTL}(4, \text{LHCE}) = \text{BRAIR}(\text{KMAXA}, 4, \text{IWC})$$

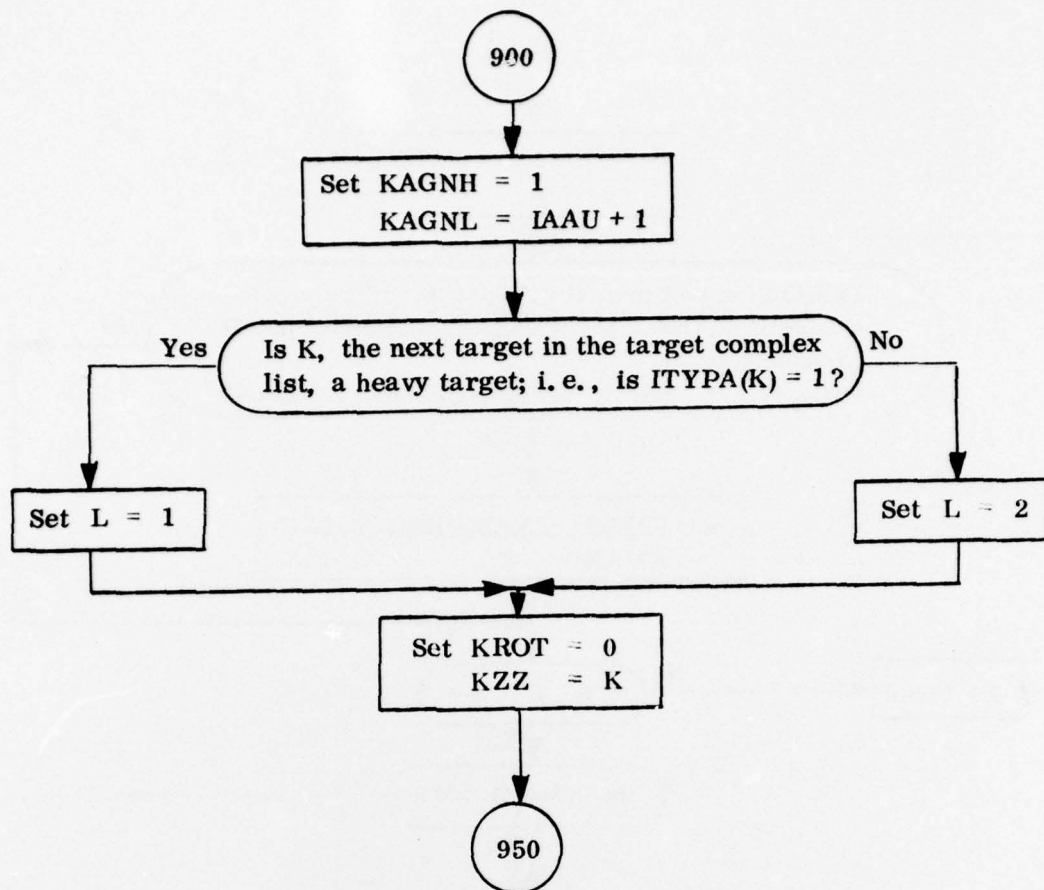
$$\text{NB} = \text{FACTL}(2, \text{LHCE}) = \text{MIN} \left\{ \begin{array}{l} \text{BRAIR}(\text{KMAXA}, 2, \text{IWC}); \\ \frac{\text{NAMO}(\text{KMAXA}, \text{LHCE})}{\text{BRAIR}(\text{KMAXA}, 1, \text{IWC})} \end{array} \right\}$$

$$\text{FACTL}(5, \text{LHCE}) = \text{NB} \cdot [\text{FACTL}(3, \text{LHCE})] + (\text{NB}-1) \cdot [\text{FACTL}(4, \text{LHCE})]$$

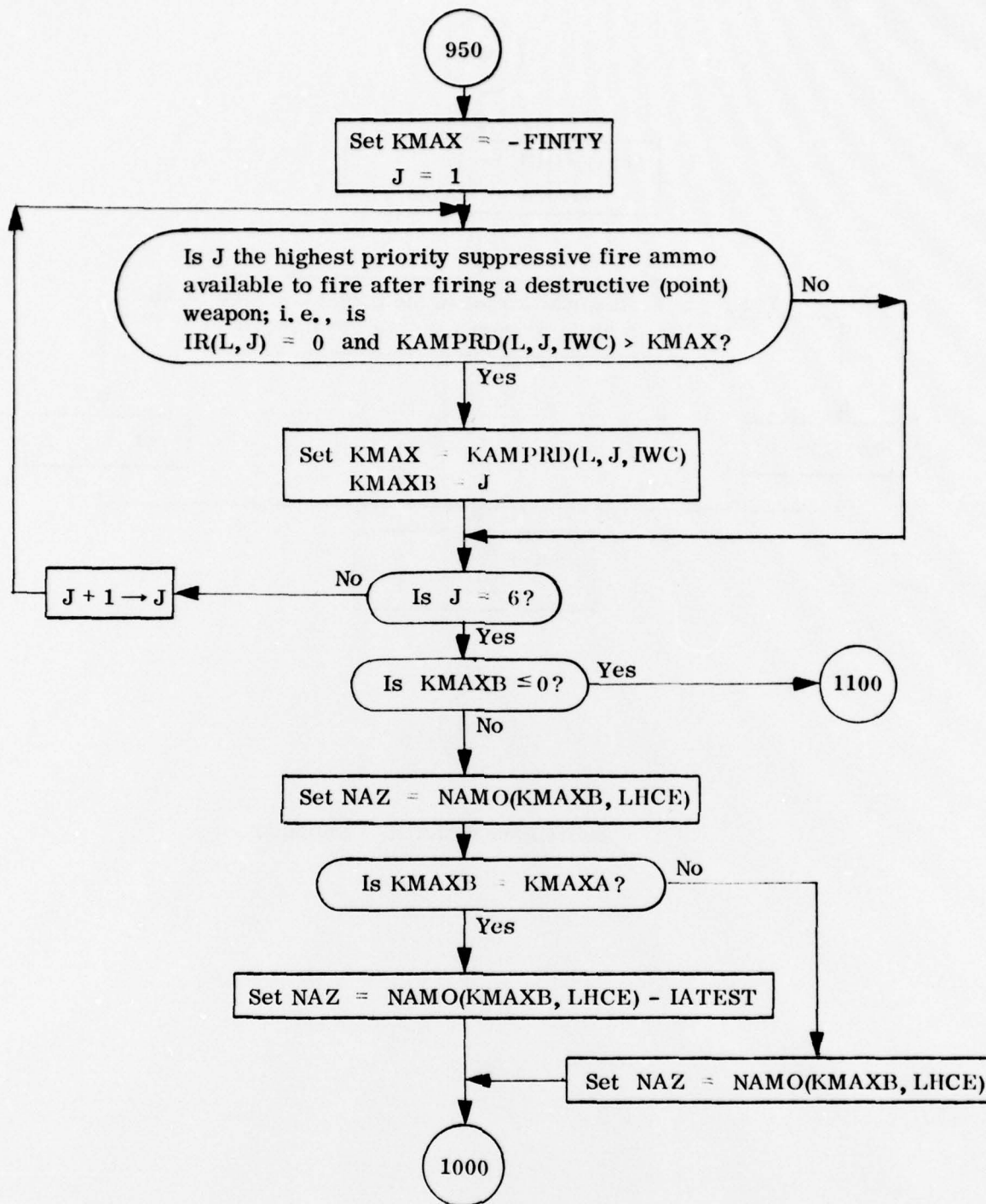
$$\text{LATEST} = \text{FACTL}(1, \text{LHCE}) \cdot \text{NB}$$

900

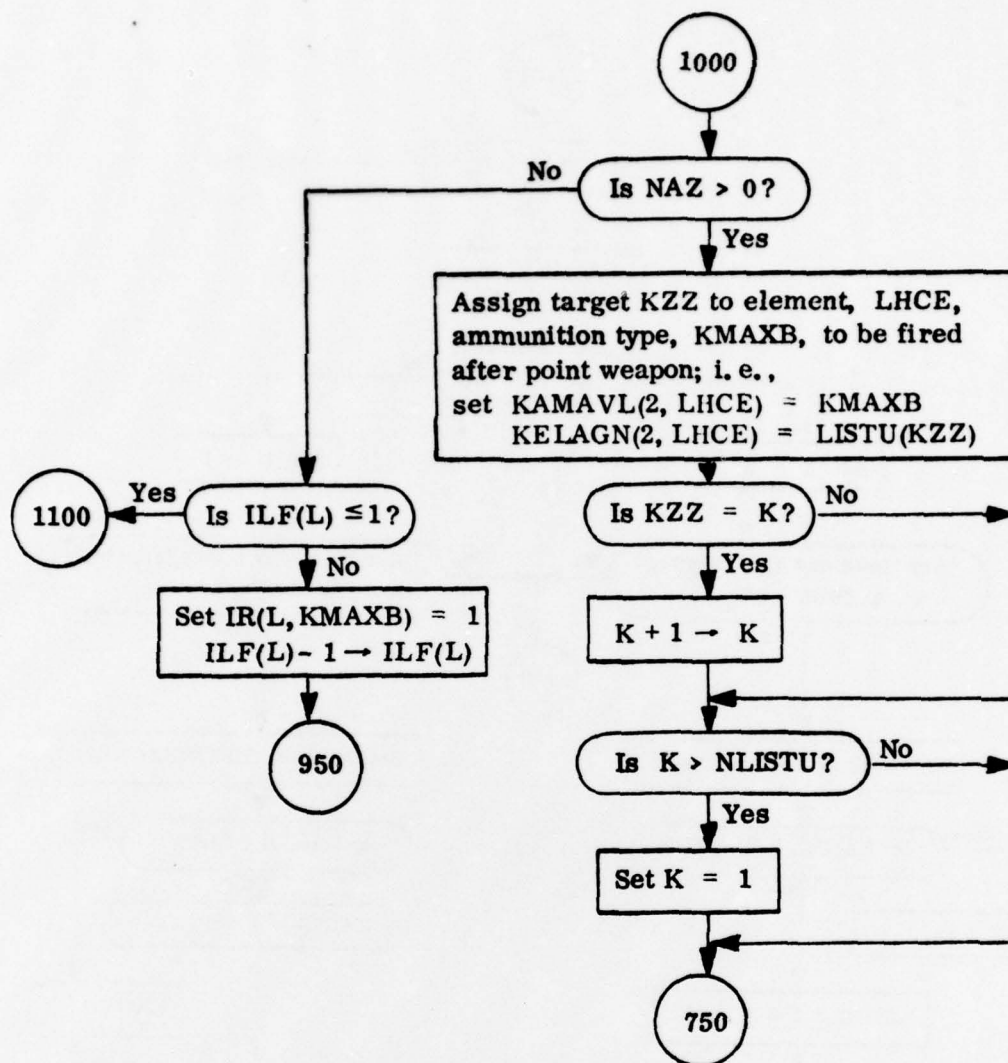
Subroutine WASAIR: Continued



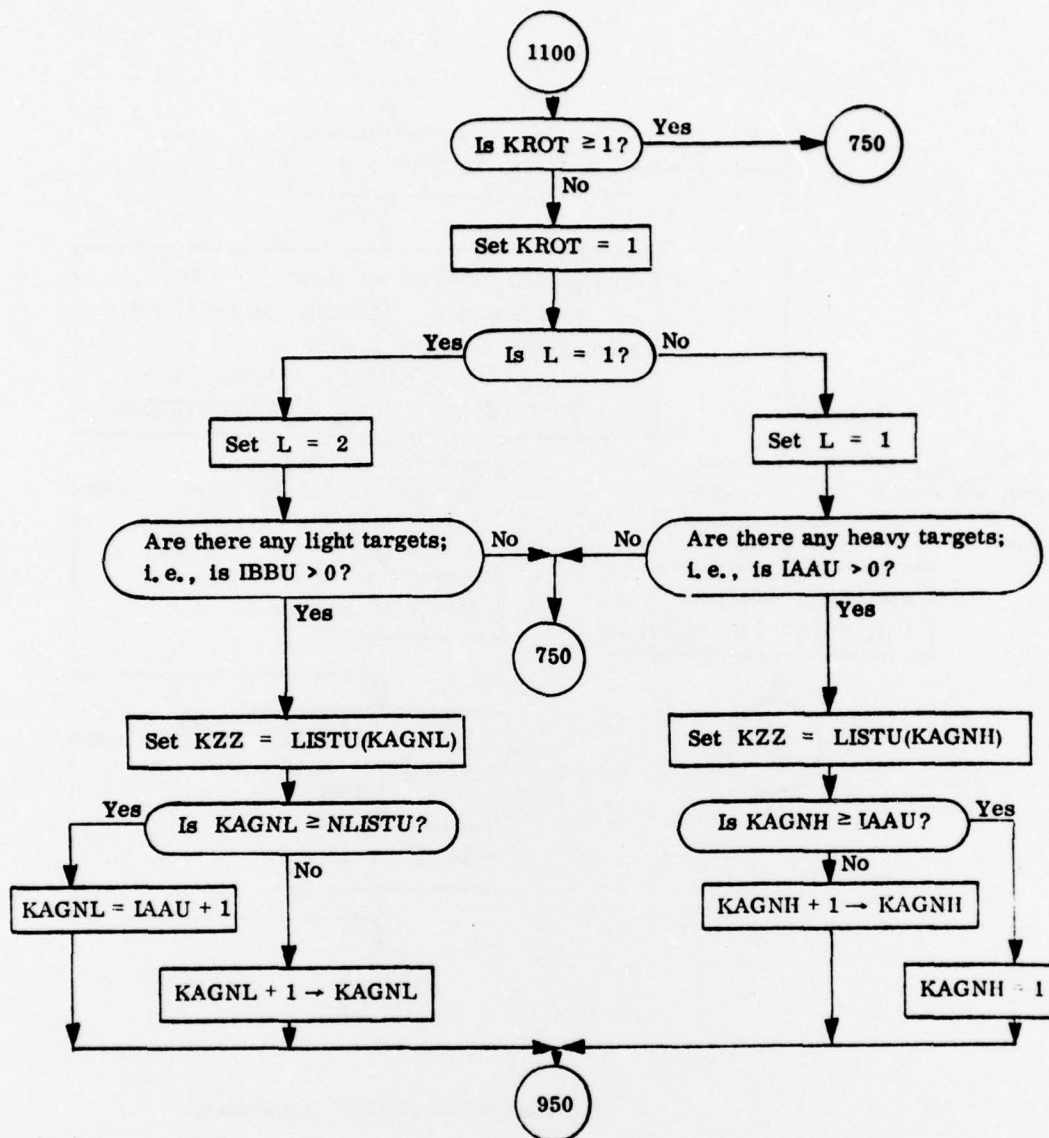
Subroutine WASAIR: Continued



Subroutine WASAIR: Continued



Subroutine WASAIR: Continued



Subroutine WASAIR: Continued

Subroutine XYLOCH

PURPOSE: Subroutine XYLOCH is used to determine the battlefield coordinates of a point in the aerial vehicle tactical difficulty grid.

CALLING SEQUENCE:

CALL XYLOCH(I,J,XIJ,YIJ)

where

I,J = row and column number in the tactical difficulty grid for which coordinates are desired

XIJ,YIJ = battlefield coordinates of the point (I,J).

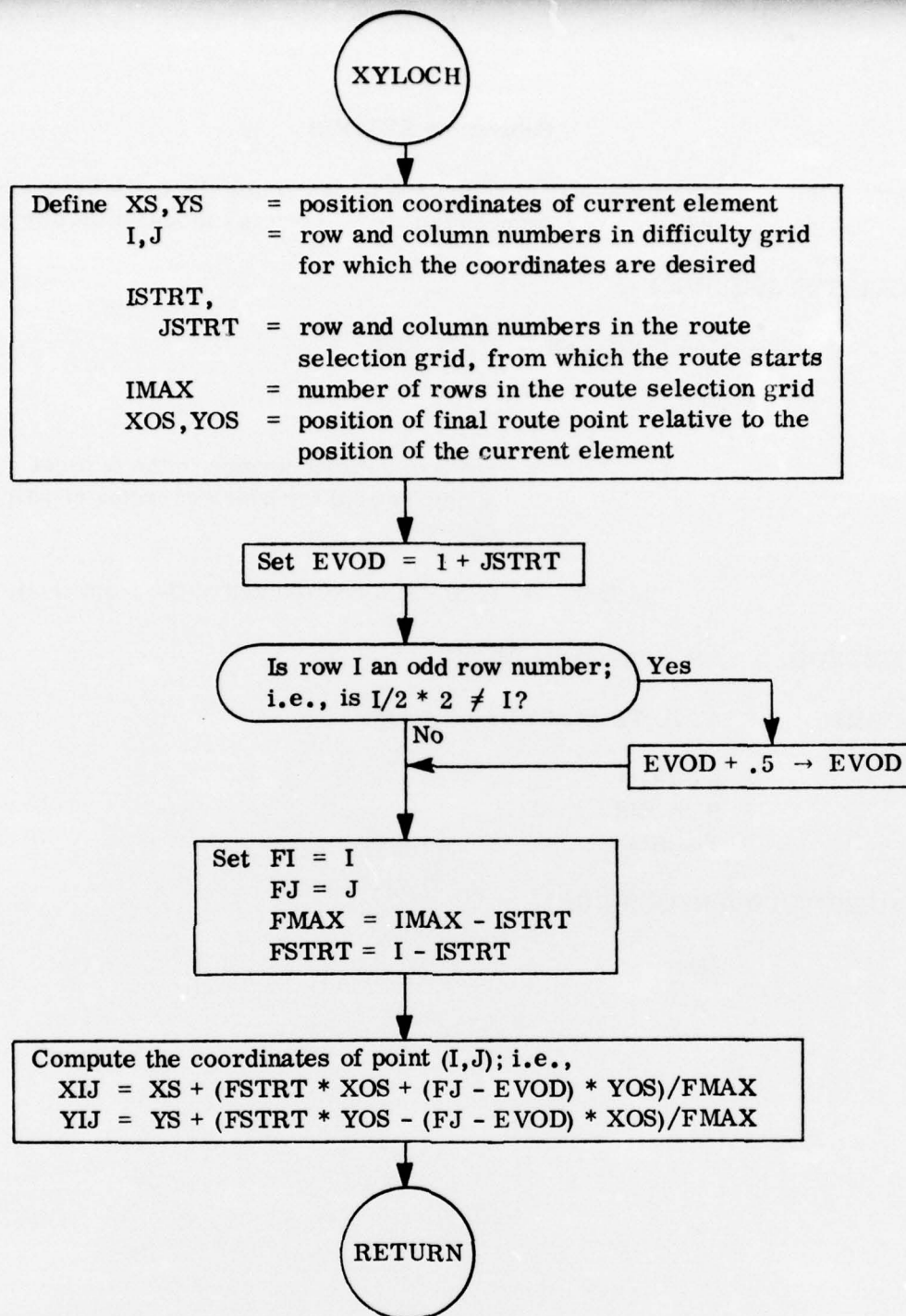
METHOD: See subroutine XYLOC.

COMMON AREAS REFERENCED:

ICECOM
RTKONH
TACKON

SUBROUTINES REQUIRED:

None



Subroutine XYLOCH: Difficulty-Grid Coordinates